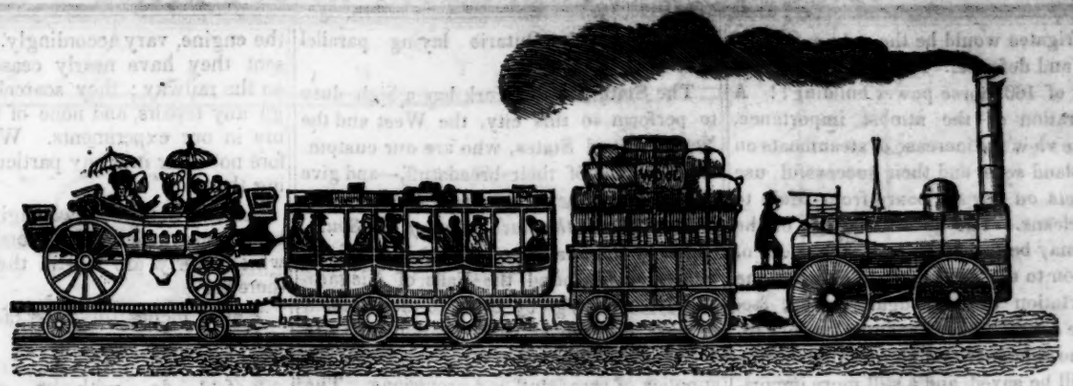

AMERICAN RAILROAD JOURNAL,
AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K MINOR, EDITOR.] SATURDAY, MAY 21, 1836. [VOLUME V.—No. 20

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, MAY 21, 1836.

JAMES RIVER AND KANAWHA CANAL.—We ask the attention of our readers to the following advertisement of the *James River* and *Kanawha* Canal Company. There is a fine opportunity for some of our enterprising contractors.

NOTICE TO CONTRACTORS.

JAMES RIVER AND KANAWHA CANAL.

PROPOSALS will be received at the Office of the James River and Kanawha Company, in the City of Richmond, from the 15th to the 23rd day of August, for the construction of all the Excavation, Embankment and Walling not now under contract, together with nearly all the Culverts and the greater portion of the Locks between Lynchburg and Maidens' Adventure.

The work now advertised embraces the twenty miles between Columbia and the head of Maidens' Adventure Pond, the eight miles between Seven Island Falls and Scottsville, and about twenty isolated sections, reserved at the former letting, between Scottsville and Lynchburg.

The quantity of masonry offered is very great—consisting of about two hundred Culverts of from three to thirty feet span; nine Aqueducts, thirty-five Locks a number of Wastes, with several farm and road Bridges.

General plans and specifications of all the work, and special plans of the most important Culverts and Aqueducts, will be found at the offices of the several Principal Assistant Engineers on the line of the Canal.

The work will be prepared for examination by the 25th July; but mechanics, well recommended, desirous of immediate employment, can obtain contracts for the construction of a number of Culverts at private letting.

Persons offering to contract, who are unknown to the subscriber, or any of the Assistant Engineers, will be expected to accompany their proposals by the usual certificates of character and ability.

CHARLES ELLET, Jr.,
Chief Engineer of the James River and Kanawha Company.

NOTE.—The Dams, Guard-Locks, most of the Bridges, and a number of Locks and Culverts, are reserved for a future letting. Persons visiting the line for the purpose of obtaining work, would do well to call at the office of the Company in the city of Richmond, where any information which they may desire will be cheerfully communicated.

The valley of James River, between Lynchburg and Richmond, is healthy. C. E. Jr.

20—ta18

We contiuue in this number, PAMBOUR ON LOCOMOTIVES ON RAILROADS. To Engineers it needs no recommendation—nor will our mechanical readers require much persuasion to induce them to read it.

NEW-YORK AND ALBANY RAILROAD.—We publish at length in this number of the Journal, the original and the amendmeat to the original, charter of this important Railroad. We also give the Attica and Buffalo, called the *Pattern* Bill, for the numerous charters granted for Railroads by the late legislature. We shall take an early opportuity of referring particularly to this charter.

SHIP CANAL.

The importance of more ample communications from the Hudson to the upper Lakes, is daily claiming the attention of our own citizens and adjacent States. The Baltimore American noticing the projected *Ship Canal* from Oswego, by Utica and the Mohawk to the Hudson says:—

"If this splendid project is feasible, *and it is said by eminent engineers to be so*, the vigorous and enterprizing state of New-York will accomplish it, and thereby secure beyond the reach of competition, the control of the trade of the vast west." That this work is feasible, and at a moderate expense in proportion to its importance, *to the whole Union*, as well as the Ship Canal around the Niagara Falls—no one can doubt, who has read the able report of engineer E. F. Johnson, (Assembly December, No. — of 1835,) or has had the opportunity to inspect the maps, and scientific report of Capt. Wm. G. Williams of the U. S. Top. Corps in relation to the work around the Falls. Capt. W. very justly considers it a *national work* of the first importance, for the defence of our frontiers connecting two inland seas and the whole west, with the sea board. This work is now as much called for at the hands of the present Congress, by memorials and petitions, as the Erie Canal was when first projected, to open the trade with the interior of this State—then more of a wilderness, than are now the new States of Ohio, Illinois, Indiana and Michigan.

A glance at the map of the United States will dispell the idea that the enlargement of of the Erie Canal, to 7 feet by 70, with locks 18 feet by 110, even were it practicable, *without interruption to the trade upon it*,—can secure and retain to our great commercial centre of the Union, the rapidly increasing trade beyond our own State, even with the assistance of the Southern and Northern line of Railroads.

The present barrier of the Niagara, can be overcome according to the report of Capt. Williams, by 7¾ miles of canal, lockage 320 feet, and at the cost of only $2,568,899. This estimate is predicated on the calculation, for a canal on the magnificent scale of 110 feet surface—locks of stone 200 feet long by 50 feet wide. This size, will carry through a frigate in ballast, and the largest class of steamboats, that floats. In the unfortunate event of a war with England,

steam frigates would be the only means of offence and defence. France has 15 afloat, and 11 of 160 horse power building!! A consideration of the utmost importance, when we view the increase of steamboats on these inland seas, and their successful use as packets on our sea board from Main to New-Orleans. The entire tonnage of the Lakes, may be transferred, at the close of navigation to the sea board, to cheapen the transportation of our sugar, cotton, &c. from the south, whilst 5 months loss of capital in the schooner and ship capital on the lakes will be saved, and a still more important considertion gained, our fresh water sailors will become *able bodied seamen*, not laid up in ordinary during the winter, and fearful as they now are to breast the storms of the lakes at the risk of life and loss of cargo to enter any port.

The apathy with which many of our citizens have viewed this subject, has surprized me. The extract from the Baltimore paper at the head of this article shows the importance of the Ship Canal, to the enterprizing citizens of that State, who are so nobly contending with us for a part of the rich dowery of the west. So far our State Legislature have done nothing to investigate this subject and we are indebted to the persevering labors of a few individuals for procuring the survey by the general government around the Falls, as also the map profile. Estimates for the Ship Canal, from Oswego to Utica, distance 92 miles, 57 natural waters—at a cost of $——

The map, profiles and estimates of this work, with the able report of E. F. Johnson, Esq., Civil Engineer, now employed by the Erie Railroad Company, are placed in the Exchange for the inspection of the public. There is little doubt, but that a canal 8 feet by 90 in continuation, from Utica along the Mohawk to the Hudson,—say 100 miles,—can be executed within the cost of four millions of dollars, and from Lake Erie to the city of New-York, within the sum of eight millions of dollars. If these positions are correct, and their consideration and examination, under respectable scientific authority has often been courted, it appears to the writer of this article the extreme of folly to attempt to enlarge the Erie Canal to a Ship Canal, 363 miles, at the certain expense of some 15 to 20 millions of dollars, if damages are added to the estimate of the State Engineer's, of cost 12½ millions, when for half of either of these sums, *we can have another*, and a better work, with only 150 miles of new canal, and this too without interrupting the trade on the Erie Canal, and its increasing tolls, which, at the present very low rates, now give us one and a half million of dollars per annum, gross income. It is idle to talk of the rights of the cities and villages, or the rent of the Erie Canal, to monopolize the entire carrying trade to and from the far west to this city, and to confine it to the present channel; with the noble Ontario laying parallel to it.

The State of New-York has a high duty to perform to this city, the West and the New-England States, who are our customers, for $\frac{8}{10}$ths of their breadstuff,—and give us in return their manufactures in cotton, *produced from the slave labor of the South*,—it is by the immediate construction of the Ship Canal around the Falls of Niagara, and from Oswego by Utica to the Hudson, thereby to cheapen transporation so as to draw upon the fertile West for additional supplies of breadstuff and provisions. The experience of this and past years has taught us the lesson, that the progress of *Agriculture in the United States is behind Manufactures and Commerce*, that is, there are more engaged in the latter branches than are supplied by the former, with all the exertions of our own State, at high prices, and great profits to the farmer, yet so inadequate have been our supplies the last winter that we have actually had to resort to Europe, for wheat, butter, rye, oats, potatoes, &c.!!

The Erie Canal has now been open for more than a month, yet wheat and flour maintains prices that would pay a handsome profit on their importation from Europe and Canada!! even with the present objectionable duties. HARLÆM.

CHAPTER I.

DESCIPTION OF A LOCOMOTIVE ENGINE.

—

ARTICLE II.

OF THE PROPORTIONS OF THE ENGINES.

§ 1. *Of the Dimensions of the parts from which the power of the Engine is derived.*

Such is the construction of the locomotive engines employed on the Railway between Liverpool and Manchester. We have made use for our experiments of no other engines but those. To give a complete idea of them, we have now only to state the dimensions of some of the parts, on which the power of the engine more especially depends, as will be seen further down.

The engines on the Liverpool Railway may be ranked in five different classes, as follows:—

Classes.	Diameter of the cylinder.	Stroke of the piston.	Wheels.	Weight.	Effective pressure per sq. in. in the boiler.
	inches.	inches.	ft. in.	tons.	lbs.
1 - -	14	16	4 6	12	50
2 - -	15	16	5	12	50
3 - -	11	16	5	8 to 9	50
4 - -	11	18	5	8 to 9	50

In the fifth class come the first engines used by the company at the opening of the railway; their cylinders are ten inches it. diameter, and under; the stroke of the piston, the wheels, and the weight of the engine, vary accordingly. But at present they have nearly ceased to be used on the railway; they scarcely ever undergo any repairs, and none of them will figure in our experiments. We need therefore not enter into any particulars concerning them.

Among the thirty-two engines that have been constructed for the company, and of which thirty are still in their possession, there are

2 of 14 inches, (diameter of the cylinder.)
4 of 12 do.
16 of 11 do. with a sixteen inch stroke.
2 of 11 do. with an eighteen inch stroke.

The eight others are of inferior proportions, and rank in the fifth class which we mentioned above.

They are all at the *effective* pressure of 50 pounds per square inch on the boiler.

In proportion as we shall make use of the engines, we shall state more particularly their names, weight and power.

§ 2. *Of the expression of the power of Locomotive Engines.*

It is by these dimensions that it is customary to express the power of locomotive steam-engines. We shall see in the course of this work, that to render that expression complete, and really sufficient to show the effect of the engine, under all circumstanstances, two other elements ought still to be added to them, viz. the friction of the engine, and the evaporating power or extent of heating surface of the boiler. However, such as they are, they give a tolerably exact idea of the power of locomotive engines.

As to the mode used for stationary steam-engines, which consists in expressing their power by the effect produced, and comparing it to the work a horse would perform, it is easy to conceive such a mode which is very deficient in all cases, as we shall see, is at all events not applicable to locomotive engines, for the following reasons:—

1. Because the power of a locomotive engine does not depend alone on the force residing in the steam; it depends also on the weight of the engine, which produces a greater or less adhesion of the wheels to the rails, and consequently the locomotion of a more or less considerable load.

2. Because the engine must move at different rates of speed. Now, besides the weight of the load, the engine must also move itself along by overcoming its own friction. That friction, entering therefore as an invariable quantity in the resistance, from which it must always be first of all deducted, it limits, according to each velocity, the final power remaining in the engine as applicable to the load. The consequence of this is, that, if we were to express the power of the engine by the effect produced, we would find that measure different at each degree of speed at which we would consider the engine.

3. Because locomotive engines moving three or four times quicker than horses can do, it would be but an unintelligible fiction to pretend to assimilate them to horses.

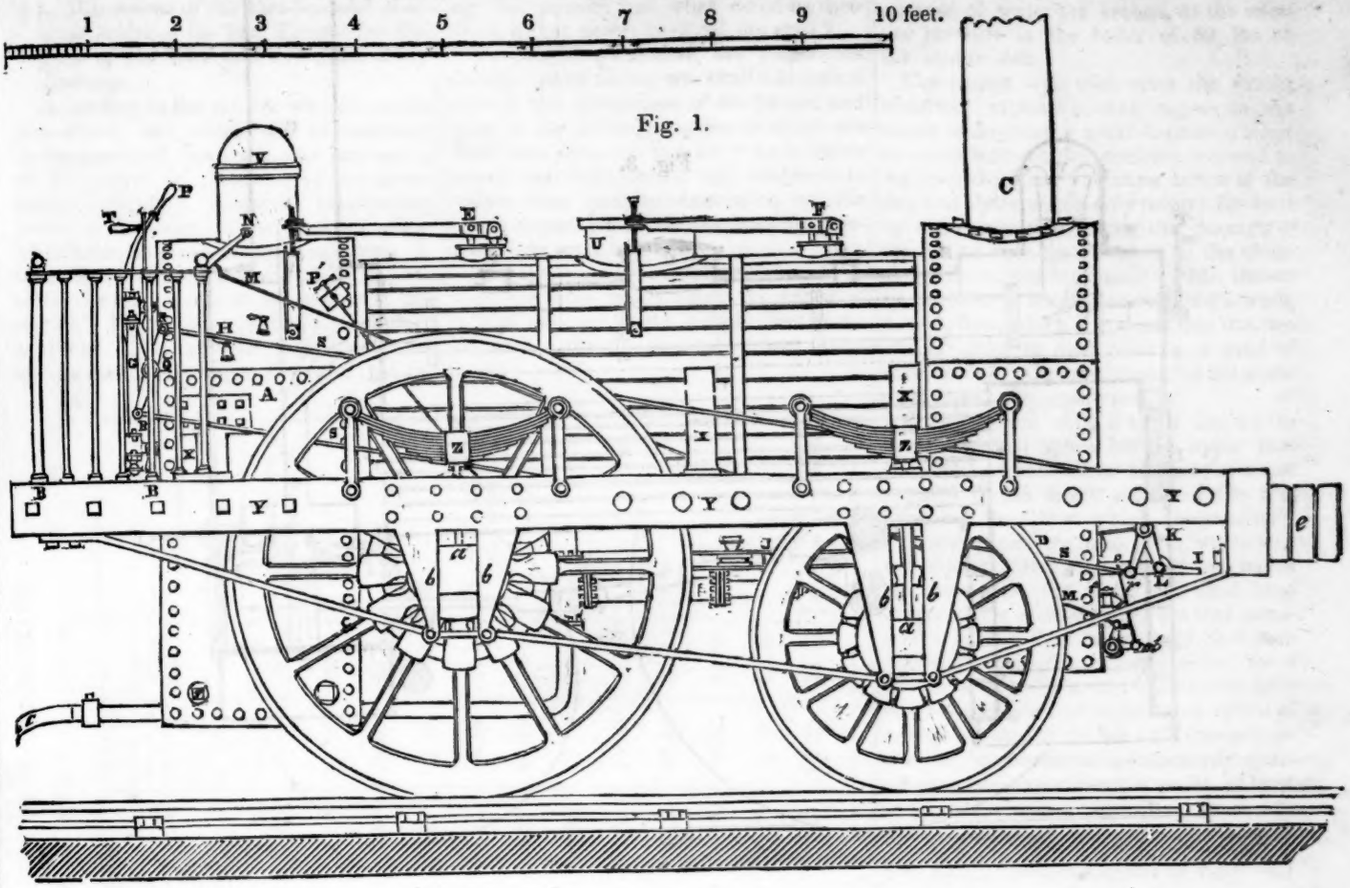


Fig. 1.

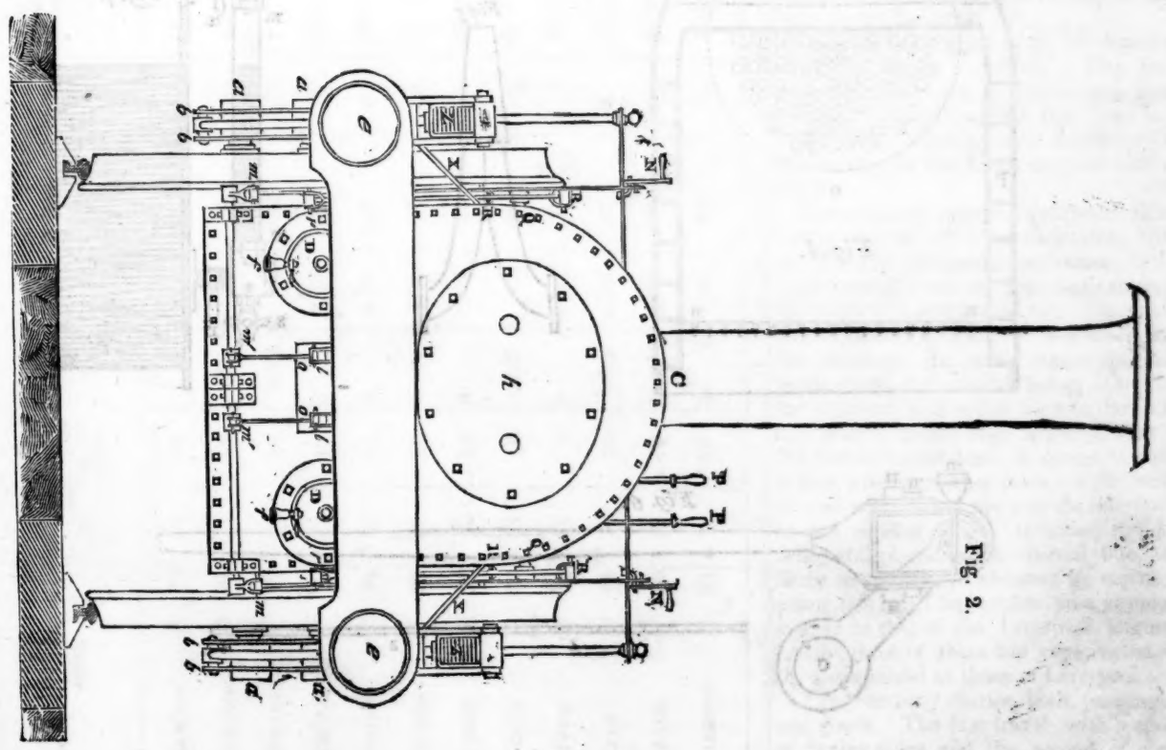
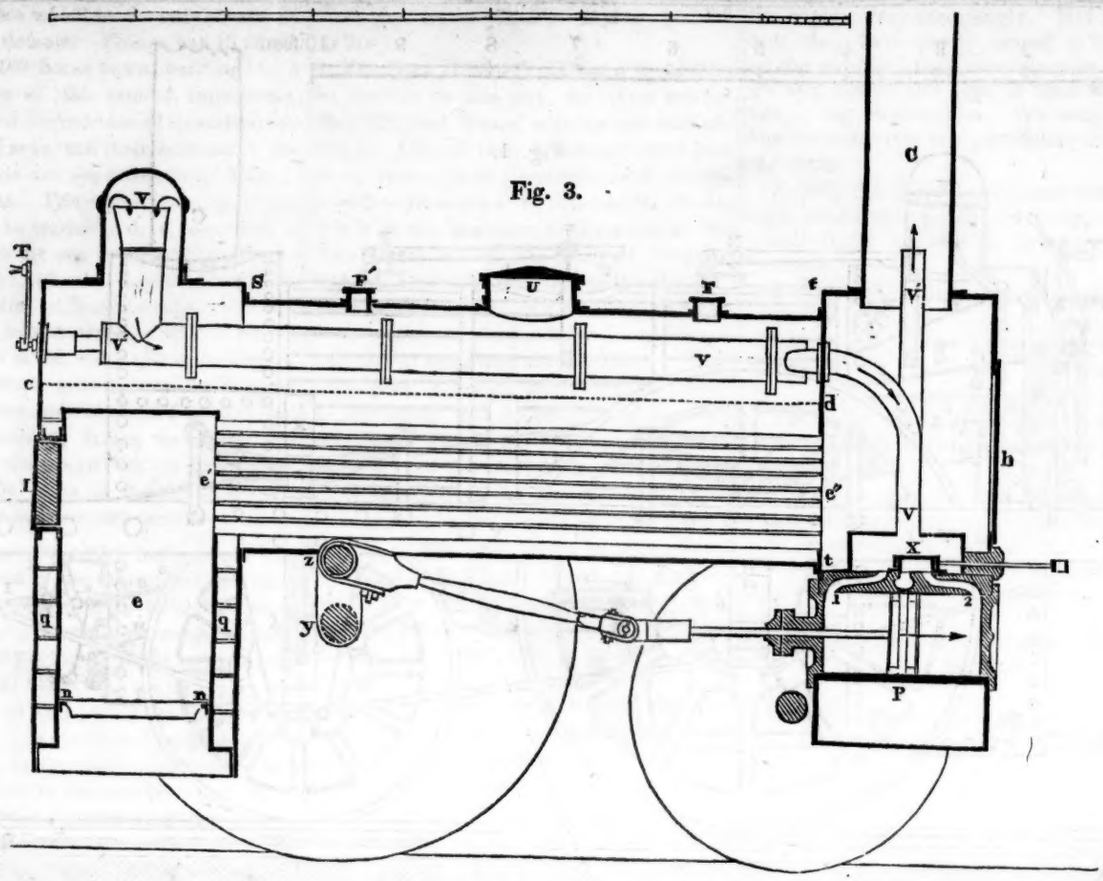


Fig. 2.

Fig. 3.



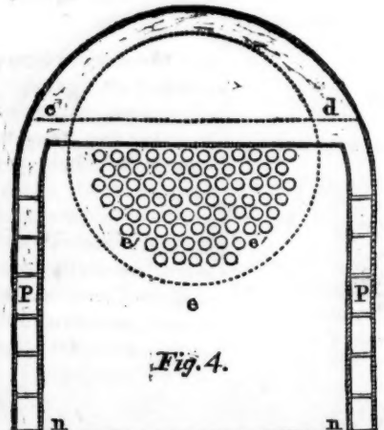


Fig. 4.

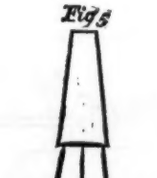


Fig. 5

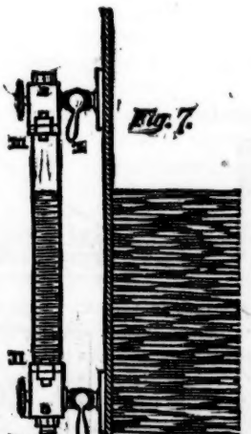


Fig. 7.

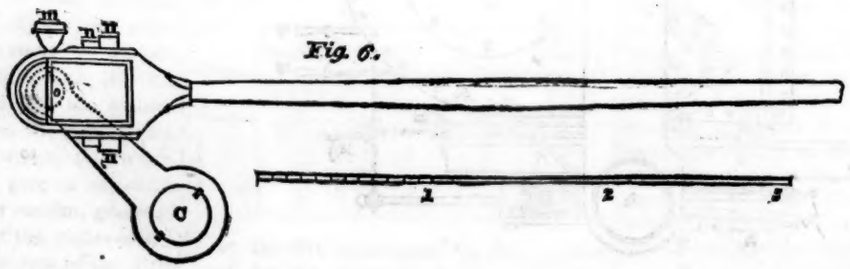


Fig. 6.

§ 3. *Dimensions of the Fire-box and Boiler in twelve of the best Locomotive Engines of the Liverpool and Manchester Railway.*

According to the remark we have made here above, and which will be confirmed in the course of this work, any expression of the power of a locomotive engine becomes imaginary, unless its evaporating power, or the extent of the heating surface of its boiler, be given at the same time. It is, in fact, in the fire-box and boiler that resides the real source of the power of the engine. From thence results all the effect produced. The cylinder and other parts are the means of transmitting and modifying the power; but what could be their effect, if that power itself did not exist?

To complete, therefore, the proportions already given above, we shall add here a table of the dimensions of the fire-box and boiler in the different engines to which we shall have occasion to refer. At a future period, our experiments will enable us to replace this complex expression by the simple expression of the evaporating power of those same engines.

The two most important columns of this table, are those which show the extent of surface exposed to the radiant heat of the fire, and to the communicative heat of the flame.

DIMENSIONS OF THE FIRE BOX AND BOILER OF TWELVE OF THE BEST LOCOMOTIVE ENGINES OF THE LIVERPOOL AND MANCHESTER RAILWAY.

Name and number of the engine.	Diameter of the cylinder.	Length of stroke of the piston.	Diameter of the boiler.	Length of the boiler and tubes.	Number of tubes.	Diameter of the tubes.	Area of the fire-box or surface exposed to the radiating caloric.	Area of the tubes, or surface exposed to the contact of the flame and heated air.	Area of the fire-grate.	Quantity of fuel contained in the firebox to the bgt. of the lowest row of tubes.	Diameter of the chimney.	Remarks.
	inches.	inches.	feet.	feet.		inches.	sq. ft.	sq. ft.	sq. ft.	cub. ft.	inches.	
Samson . . No. 13	14	16	3.50	7	140	$1\frac{5}{8}$	40.20	416.90	7.50	10.87	12.50	This engine is now being reconstructed.
Jupiter . . " 14	11	16	2.75	6.50	79	do.	36.06	226.80	6.08	11.12	12	
Goliath . . " 15	14	16	3.50	7	132	do.	40.31	407	7.50	10.87	12.50	
Vulcan . . " 19	11	16	3	6.50	107	do.	34.45	307.38	6.50	7.64	13.50	The tubes of this engine are very thin.
Fury . . . " 21	11	16	3	6.50	107	do.	32.87	307.38	6.12	8.13	13.50	
Victory . . " 22	11	16	3	6.75	97	do.	37.63	278.53	6.27	11.47	13.50	
Atlas . . . " 23	12	16	3	7.88	65	do.	57.06	217.88	9.20	13.06	12	
Vesta . . . " 24	$11\frac{1}{8}$	16	2.75	7	80	do.	46	256.08	7.06	11.72	1.150	
Liver . . . " 26	11	16	3	6.50	97	$1\frac{3}{8}$ / $1\frac{3}{8}$	39.66	284.01	8.11	12.48	13.50	
Ajax . . . " 29	11	18	2.75	6.66	63	2	32.64	228.14	6.08	8.32	13.50	
Leeds . . " 30	11	16	3	6.50	107	$1\frac{5}{8}$	34.57	307.38	6.19	8.23	13.50	
Firefly . . " 31	11	18	3	7.50	110	do.	43.91	362.60	7.16	14.30	13.50	The fire-box of this engine is at present being altered.

It will be seen hereafter, that with a boiler of those dimensions and of such a form, the engines are able to evaporate about a cubic foot of water per minute, or a pound of water per second, at the effective pressure in the boiler of 50 lbs. on the square inch.

Comparing with each other the extent of surface exposed in each engine to the action of the heat, a great distinction must be made between the surfaces exposed to the immediate and radiating action of the fire, and those which only receive the heat by communication, during the passage of the hot air from the fire-place to the chimney. An experiment made by Mr. Robert Stephenson is mentioned in Wood's work, p. 403, from which it appears that the two effects stand to each other in a ratio of three to one. Circumstances did not allow us to repeat the experiment.

It was made with a boiler similar to those described above, but the upper part of which had been taken off, and the water exposed to the direct action of the fire, separated from that which receives only the communicative heat; the water was put into ebullition, and, after it had boiled for some time, the water that had been evaporated in each compartment was measured. It was then ascertained that each square foot of surface exposed to the heat of the radiating caloric, had evaporated three times as much water as the same extent of surface exposed to the hot air. This proportion may be considered as sufficieutly established by the experiment, in so far at least as regards a boiling apparatus, similar to those described above.

§ 4. *Of Locomotive Engines of a different construction.*

The description given above is applicable to the most powerful engines constructed until the present time. That form is exclusively adopted on the Liverpool and Manchester Railway.

On other lines, engines of different constructions are to be found. The Railroad from Stockton to Darlington being used for a different service, that is to say, for a more moderate speed, it may be proper to give here an idea of the engines used on that line.

The company possess twenty-three locomotive engines of different models, from the oldest to the most recent ones.

In some of them the fire passes through the boiler in a single tube, which serves as a fire-box, and communicates directly with the chimney. In some others the tube bends round in the boiler before it reaches the other end, and comes back to the chimney, which, in that case, is placed next to the door of the fire-box. In others, the tube or flue, when it reaches the end of the boiler, divides and returns towards the chimney, as two smaller tubes. In some, the fire being still placed in an internal flue, the flame returns to the chimney by means of about 100 small brass tubes, on a principle similar to that of the Liverpool engines. Lastly, three of them are constructed on the same model as those of Liverpool.

The company carries both passengers and goods. The first travel with a speed of twelve miles, and the second of eight miles an hour. Of the different forms of boilers, those only with a set of small tubes suit for carrying passengers; the others

cannot generate a sufficient quantity of steam. But when a speed of eight miles per hour only is required, and for an average train of twenty-four wagons, which, in going up the line empty, are equal to a load of about sixty tons on a level ground, the most convenient boilers have been found to be those with one returning tube. They generate a sufficient quantity of steam for the work required of them, and have the advantage of being cheap in regard to prime cost and repairs, as their form is simple, and they are entirety made of iron, whilst the tube boilers require the use of copper.

Besides the difference in the form of the boilers, the other parts of the engine differ also. The cylinders are placed on the outside, and in a vertical position. The motion is not communicated from the piston to the engine by a crank in the axle, but by a rod on the outside of the wheel, resting upon a pin fixed in one of the spokes. Those engines have in general six equal wheels, of four feet diameter each. Two of the wheels are worked by the cylinders, as has been just explained; and the four others are attached to the first by connecting rods, that cause them to act all together.

The weight of these engines varies. Setting aside the three which we have mentioned as being on the model of the Liverpool ones, and which weigh only about five tons and a half, the average weight of the others is from ten to twelve tons.

All those engines are supported on springs. In some of the older ones, the water of the boiler, pressing upon small moveable pistons, and pressed itself by the steam contained in the boiler, was intended to supersede the springs; but though that system displayed a great deal of ingenuity, the spring it formed was found in practice to be too variable, and the system was given up.

The usual proportions adopted for the engines on that railway are the following:

Cylinder	- -	14½ inches.
Stroke	- -	16 —
Wheels	- -	4 feet.
Weight	- -	11 tons.
Effective pressure	-	48 lbs. per sq. in.

The pressure, however, varies according to the ascertained solidity of the boiler. When the sheets of which it is formed begin to grow very thin, the pressure is sometimes reduced to 36 lbs. only per square inch; in other circumstances, it is, on the contrary, increased to 60 lbs.

CHAPTER II.

OF THE PRESSURE IN STEAM-ENGINES.

ARTICLE I.

OF THE PRESSURE CALCULATED ACCORDING TO THE LEVERS AND THE SPRING-BALANCE.

§ 1. *Of the principle on which that calculation is founded.*

When an elastic fluid is confined in a closed vessel, it produces in every direction on the sides of the vessel a pressure, which is the result of its elastic force, and which gives the exact measure of that force. If, the vessel being already filled with steam, a fresh quantity is continually added, the elastic force of the steam will augment more and more, and consequently also the pressure it produces on every square inch of the surface of the vessel. Now, if at one point of the vessel there be an aperture, closed with a moveable piece supporting a certain weight, it is clear that, as soon as the steam contained in the vessel produces upon the moveable plate a pressure equal to that of the weight which holds it down in the opposite direction, the plate will begin to be lifted up; the passage will then be opened, and the steam escaping through the aperture, will show that its pressure was equal to the weight that loaded the plate or valve.

It must, however, be observed, that the resistance which opposes the egress of the steam does not consist only in the weight that has been placed on the valve. Besides that weight, the atmosphere produces also on the valve a certain pressure, as well as upon every other body with which it comes in contact. That pressure is known to be equal to 14.7 lbs. per square inch. It is therefore the weight, added to the pressure of the atmosphere, that gives the real measure of the elastic force of the steam; while the weight alone represents only the surplus of the pressure over the atmospheric pressure, or what is called the *effective* pressure of the steam. Consequently, when a valve has a surface of five square inches, and supports a weight of 250 lbs., which, divided between the five square inches, gives a resistance of 50 lbs. per inch, that amount of 50 lbs. expresses the *effective* pressure of the steam, a valuation frequently made use of on account of its convenience for calculation, whereas, 64.7 lbs. is the real resistance opposed, and therefore the real pressure of the steam.

This is the principle on which are established the means of judging the amount of pressure in locomotive engines. However, as those engines are required to work with at least 50 lbs. effective pressure per square inch, and as, in order to give passage, if necessary, to all the steam generated in the boiler, a valve must not have less than 2½ inches diameter, or 5 square inches surface, it follows of course that if a weight is to be applied directly upon the valve, it must be equal to 250 lbs. Such a weight would afterwards render it very difficult to lift up the valve with the hand, which frequently becomes necessary in the working of the engine, and particularly to ascertain whether the valve may not have contracted an adhesion to its seat which would make it useless.

It was therefore necessary to produce the pressure by means of a lever; for, if we suppose the lever divided in the proportion of 5 to 1, a weight of 50 lbs. suspended at the end will be sufficient to produce the required pressure without the disadvantage of having a considerable weight to move. But, on the other hand, as, in the rapid motion of the engines, a weight suspended at the end of a lever was found to be continually jerking, and consequently opening and shutting continually the valve, the weight was replaced by a spring, and that is the manner in which the valves are at present constructed.

§ 2. *Of the Levers and Spring-Balance.*

It will easily be conceived that no exact calculation can be established of the power of locomotive engines, without knowing exactly the pressure of steam in the boiler, which is the intenseness of the propelling force of the motion. If we were to depend on the *nominal* pressure of the engine, that is to say, the pressure declared by the constructor, great mistakes might be incurred: for it sometimes happens that, with a view to give to a locomotive engine the appearance of executing more than others, though at the same pressure, its pressure is declared to be 50 lbs. per square inch, whilst it really is 60 or 70 lbs. Moreover, the calculation of the pressure is generally so incorrectly made, that scarcely any dependance can be placed upon it.

We have therefore been obliged to make a particular study of that part of our subject.

We shall first give the manner of ascertaining the pressure by weighing and measuring the different parts of the valve apparatus, in case one should have no mercurial gauge. We shall afterwards show the cause of some mistakes which may be incurred by that mode of calculation, and which are avoided by using the mercurial steam-gauge. Lastly, we shall point out the uncertainty to which also that instrument is liable, and we shall propose another to be used instead of it.

We have said, that, to produce on the valve a great pressure without being encumbered with a considerable weight, a lever is employed. M (fig. 16) being the boiler, and S the valve, C is a fixed point to which is fastened one of the ends of the lever BC. The lever presses at the point A on the valve by means of a pin, and at the point B it supports a weight, or to speak more accurately, it is drawn by a spring equal to a given weight.

The diameter of the valve, the proportions of the lever, and the weight suspended at the point B, or at least the weight represented by the tension of the spring being given, it will be easy to deduce from them the pressure resulting on each square inch of the surface of the valve. And, *vice versa*, it will also be easy to know what weight ought to be applied to the point B, in order to produce at A a given pressure. For, if P represent the weight suspended at B, that weight will produce on A a pressure

$$P \times \frac{BC}{AC}$$

which will consequently be the whole pressure produced on the valve; and if S represent the surface of the valve in inches

$$\frac{P \times \frac{BC}{AC}}{S}$$

will be the pressure produced on each square inch of the surface of the valve.

The levers and valves used by the different constructors of engines vary con-

siderably in their proportions. But, among those proportions there is one, first used by Mr. Edward Bury, of Liverpool, which possesses an uncontested advantage over all other combinations of that sort. It consists in taking for the proportions between the two branches of the lever the ratio of the area of the valve to the unit of surface. By that means the weight P suspended at B gives immediately the pressure produced on the valve per unit of surface. Supposing it should be required to establish a valve of 2½ inches diameter, which make very nearly 5 squre inches surface, and that. in consequence, the ratio between the two branches of the lever has been taken as 5 to 1, that is to say, that $\frac{BC}{AC}=\frac{1}{5}$; P expressing the weight suspended at B, it is clear that the pressure produced at A will be $P \times \frac{BC}{AC}=5P$. This will, therefore, be the total weight on the valve, and the surface of the valve being 5 square inches, the weight or pressure per inch will be $\frac{5P}{5}=P$. The same would take place if, having a valve 3 inches in diameter, which gives 7 square inches for the surface, the ratio between the branches of lever were to be taken as 7 to 1.

We have said that, to the weight which ought to be snspended at the end of the lever at B, is substituted the equivalent pressure of a spring. This spring is a spiral, which by being more or less compressed, is able to support in equilibrium, and consequently to represent larger or smaller weights. In other words, it is a spring balance, such as is used for weighing in daily occurrences.

This balance consists of a rod T (fig. 16) which is held in the hand, and to which is fastened a plate with a narrow oblong aperture in it. Behind this plate, and in a cylindrical tube, is a spring, the foot of which rests on the basis L, which is fixed to the plate. At its other end, this same spring is pressed by a moveable transverse bar *mn*. At the bottom of the aparatus is a rod P, to which are fastened the objects that are to be weighed. The prolongation of the bar *mn* projects throngh the aperture of the plate, and is terminated by an index which appears on the outside, and which slides up and down the aperture, in proportion as the spring is more or less compressed. Divisions are engraved along that same aperture. In order to mark them, known weights of 1 lb., 2 lbs. &c., are successively suspended at P, and according as those weights, by pressing on the spring, cause the index to rise, the corresponding divisions are marked. The consequence of this is, that when an object of unknown weight is suspended at P, and makes the index rise to the point marked 10, that is to say, to the same point to which a known weight of 10 lbs. made it rise, we conclude that that object also weighs 10 lbs. This is the sort of balance which is used for measuring the pressure in locomotive engines. We see that, by taking it off from the engine, and suspending known weights to it, the divisions may easily be verified, after the balance is graduated.

When on the engine, the foot P of the balance, where the object to be weighed would be suspended, is fixed in a solid manner to the boiler; and the rod T, which would be held in the hand in common weighing, is fastened to the end of the lever. This rod passes through an aperture cut through the end of the lever, and is fixed above it by a screw which rests upon the lever. When it is required that this balance shall produce a pressure of 10 lbs., nothing more is necessary than to lower the screw until the spring rises to the point marking 10 lbs., and the same for any other weight.

Vice versa, the steam being in the boiler at an unknown degree of pressure, if we loosen gradually the screw until the steam begins to raise the valve, that is to say, until its pressure stands in equilibrium with the pressure of the spring, the pressure of the steam will be known, for the degree then marked by the index will show the weight which is equal to it.

§ 3. *Of the corrections to be made to the Weight marked by the Spring-balance.*

The mode we have just explained is the one commonly used to calculate the pressure on the valve. However, it will easily be conceived, by the manner in which the spring-balance acts upon the valve, that, to know the pressure which really opposes the egress of the steam, it is not sufficient to read the degree where the index stops, and to calculate the effect produced at the end of the lever, as we have done above. In fact, first, besides the weight represented by the spring, and which would be suspended at the end of the lever, it is clear that the weight of the lever itself causes a certain degree of pressure; for before the steam is able to raise an ounce of the spring, it must raise the whole weight of the lever. The same takes place in regard to the disk of the valve, which must be raised before the steam can have any action on the balance. 2. When any object is weighed with the hand, that object is suspended at the bottom of the balance, but then the hand supports the upper part, that is to say, the rod, with the spring to which it is fastened; and that effort is not taken into account, because it does not make a part of the weight. Here, on the con trary, the rod, the screw, and the spring, are an additional weight really suspended at the end of the lever, over and above the pressure marked by the spring; they must all be raised before the spring can be pressed upon in any way, and can register any effort; they must therefore be taken into account. The true pressure which takes place on the valve will consequently not be known, until are added to the weight marked in the balance: 1. The pressure produced by the weight of the lever at the place of the valve: 2. The pressure produced at the end of the lever by the weight of the rod and spring of the balance.

1. To know the effect of the lever on the valve, the lever must be unfastened from the balance; a string must be wound round the pin A, or passed through the aperture of the lever at that place, and then, with another spring-balance, the lever must be weighed by means of the string. It is clear that the weight marked by the second balance will be the pressure produced by the lever at the place of the valve; to that must be added the weight of the disk of the valve, which must also be weighed separately, by putting it into the basin of a common pair of scales. When the levers have a total length of 3 feet with the usual thickness, they commonly weigh 27 lbs. or 28 lbs. at the place of the valve. The disk of a valve of 2½ inches diameter, and half an inch thick, weighs in general about 10 ounces. There is therefore a weight of 28½ lbs. to be divided on the whole surface of the valve; so that if that surface is equal to 5 square inches, it makes 5½ lbs. per square inch. When the levers are only 15 inches long, they generally weigh 7½ lbs. at the place of the valve, which makes, together with the disk, 8 lbs. 8 oz., and divided between the 5 square inches, a little more than 1½ lbs. per inch.

2. To know the weight of the part of the balance supported by the lever, the balance ought to be taken to pieces, and the spring with its rod weighed separately. However, this operation may be avoided by taking the balance in one's hand, and suspending it in the contrary direction in which it is placed in the common act of weighing, that is to to say, with the foot above and the rod below; the weight marked by the index will then be equal to the difference between the weight of the rod and spring, and the weight of the foot. If, therefore, the total weight of the balance be known, which is easy, by placing it in the basin of a common pair of scales, the weight of each of its parts may easily be calculated, and consequently also the weight of the rod and spring.

In fact, the degrees having been marked on the balance when in its usual situation, zero was inscribed at the point where the index stood when the spring bore no weight at all, or more exactly when it only bore the weight of the foot. Afterwards fresh weights were successively added, and for each of them the corresponding number was inscribed on the plate, always omitting the weight of the foot, which in fact ought not to be reckoned. The numbers inscribed on the plate represent, consequently, the real tension of the spring, less the weight of the foot of the balance. Now, by turning the balance upside down, the spring is drawn by the weight of the rod and spring which it then bears. If it had borne a weight equal to that of the foot, it would have marked zero; if, therefore, it marks 2 lbs. or 3 lbs., the rod and spring weigh 2 lbs. or 3 lbs. more than the foot.

Supposing thus: B to be the total weight of the balance, T the weight of the rod and spring, and P′ the weight of the foot; if the balance turned upside down shows *m* weight, we shall have

$$m = T - P';$$

but, on the other hand, the weight of the balance is equal to the weight of its two parts, or

$$B = P' + T:$$

adding therefore together these two equations, we find

$$B+m = 2\,T, \text{ or } T = \frac{B+m}{2}.$$

When the valves have a lever of 15 inches only, the balance used weighs generally 4 lbs., and when turned upside down, it marks $1\frac{1}{2}$ lb.; so in that case the weight, of the rod and spring is

$$T = \frac{4+1.5}{2} = 2.75 \text{ lbs.},$$

which is the weight to be added at the end of the lever; that is to say, to the weight already marked by the balance.

When the valve has a lever of 3 feet, the balance requires smaller divisions. It usually weighs only 2 lbs., and turned upside down, marks $1\frac{1}{2}$ lbs., which gives in that case for the weight of the rod and spring

$$T = \frac{2+1.5}{2} = 1.75 \text{ lbs.}:$$

adding therefore those weights to those marked by the index of the balance, and taking besides into the account the weight of the lever, as mentioned above, we shall then have the real pressure produced by the whole apparatus on the valve. Dividing it by the area of the valve, the result will be the pressure effected upon each unit of surface.

From this we see that, with a long lever, the error of pressure per square inch may amount to 7 lbs. or 8 lbs., and that, even with a short lever, it may be 3 lbs. or 4 lbs., which is still considerable.

Keeping the preceding notation, that is to say, P being the weight shown by the index, T the weight of the rod and spring, L the weight of the lever, weighed as mentioned above, and D the weight of the disk, lastly BC and AC being the arms of the lever, and S the surface of the valve in square inches, the pressure produced per unit of surface will be

$$\frac{(P+T)\frac{BC}{AC} + L + D}{S}.$$

It is for not having taken these considerations into account that we find so often on locomotive engines spring-balances, which are supposed to be fixed at 50 lbs. pressure per inch, but which are really fixed at 55 lbs. or 60 lbs. We shall soon have frequent occasion to apply and verify these principles, which by that means will be rendered perfectly clear.

§ 4. *Of the Miter of the Valves.*

These are not the only causes from which errors may result. There are two others which are frequently met with in the valuation of the pressure of locomotive engines, and which are not so easy to correct as those we have just mentioned.

In order that the valves may exactly close the opening to which they are applied, without being subject to contract an adhesion with the seat that supports them, it is necessary to make them slightly conical, or at last with a slanting border. When these valves rest upon their seat, which they completely fill, it is very clear that the steam can only act upon their inferior surface; consequently, the area we have here above expressed by S, must be taken after the *inferior* diameter of the valve. By calculating in that manner, the exact pressure will indeed be found for every case in which the valve still touched the seat, or, if raised at all, was only so for an instant, or in a very small degree; but whenever the steam, being generated in greater quantity than it is expended by the cylinders, escapes with force through the valve, it raises considerably the disk of the valve; the consequence then is, that, instead of acting on the inferior surface of the valve, it evidently acts on a greater surface, and which is the greater the more the valve is raised. For instance, in fig. 20 it acts on the surface *cd* instead of acting on *ab*. In that case the area S ought to be calculated on *cd*, and not on *ab*. But how are we to know *cd*, unless we calculate it by the rising of the valve, which is a very difficult, if not an impossible, operation? Moreover, the difficulty is complicated by the circumstance that, from *a* to *b* the pressure of the steam acts directly to raise the valve; but from *c* to *a* and from *b* to *d* the action of the steam takes place only in a lateral direction, and according to an angle, which varies in proportion as the valve is more or less raised.

The effect of this alteration in the diameter of the valve, which at first sight appears to be of very small consequence, is in fact very considerable. Let us suppose, for instance, that we have a valve of 2.50 inches diameter at the bottom, and 3 inches at the top, of which we shall find several examples hereafter. Let us further suppose that, by the effect of the blowing of the steam, the valve has been raised so as to have increased its real diameter only by one-eighth of an inch; that is to say, that it is become $2\frac{5}{8}$ inches instead of $2\frac{1}{2}$ inches, or 2.625 inches, instead of 2.50 inches. The surface of the circle being expressed by $\frac{1}{4}\,\pi\,d^2$, where d stands for the diameter and $\pi = 3.1416$, the proportion of the circumference to the diameter, the surface of the valve, which was at first

$$\frac{1}{4} \times 3.1416 \times \overline{2.5}^2 = 4.91 \text{ sq. inches},$$

has become

$$\frac{1}{4} \times 3.1416 \times \overline{2.625}^2 = 5.41 \text{ square inches}.$$

Consequently, if we suppose the total weight supported by the valve, including the levers, rod, disk, &c., to be 245 lbs., that weight, when the valve is shut, will represent a pressure per square inch of

$$\frac{245}{4.91} = 50 \text{ lbs.};$$

and when the valve is raised, that same weight will only represent a pressure of

$$\frac{245}{5.41} = 45.27 \text{ lbs.};$$

by which we see that the same weight marked by the balance corresponds to very different pressures of steam, when the valve is shut or when it is raised.

Continuing, in the case of a blowing-valve, to calculate upon what is called the diameter of the valve, that is to say, on its inferior diameter, an error will thus be committed of 5 lbs. pressure per inch, which error might be still greater if the raising of the valve should happen to be more considerable. Moreover, as there is no practical means by which to learn by how much the diameter of the valve is augmented by the raising, the consequence will be that the mode of calculation explained here above, even with the corrections we have made, will apply exactly only to those cases where the valve just begins to be raised, or lets scarcely any steam escape; but the greater the raising the more the calculated amount will surpass the real pressure. We shall see hereafter examples of this.

But still this is not all. If the pressure of the steam in the boiler must be deduced from maasurements taken on the engine, it must also be observed that it frequently happens, in order to make the construction more easy, that the miter of the valve is made to join the sides of its seat only within a certain breadth, as may be seen in fig. 21. The consequence is, that the surface *ab*, or the inferior part of the valve, which has been measured, is not the surface upon which the pressure is divided. The real diameter in this case is *cd*, If therefore there be between *ab* and *cd* a difference, for instance, of one-eighth of an inch, this difference may produce, as well as in the case of the raising of the valve, a difference of 4 to 5 lbs. in the pressure. Mistakes may be avoided in that respect, by measuring not only the inferior diameter of the valve, but also the diameter of its seat. There still, however, remains the blowing of the valve, the exact appreciation of which escapes all manner of calculation.

The mercurial gauge, which we are going to describe, is the means of avoiding both causes of error; but that instrument is expensive, and as yet so scarce, that in all the factories and on all the railways, except the Liverpool one, there is at present no other mode of ascertaining the pressure than those explained above.

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ARTICLE II.

OF THE MERCURIAL STEAM-GAUGE.

§ 1. *Construction and use of the Mercurial Steam-gauge.*

The calculations we have made may be sufficiently exact for a great number of cases. Still they present some degree of complication that makes them inconvenient; besides, they cannot be made without measuring and weighing different parts of the engine, which operations require time and care, and can only take place when the engine is at rest. We may therefore easily conceive the great utility of an instrument which at first sight, and by its bare inspection, will give the exact measure of the pressure of the steam. By means of such an instrument, all cases, even those of the raised valve, present no longer any difficulty, and the nccessity of calculation itself may be dispensed with. The only thing required is, the possibility of submitting the engine to the proof.

The instrument used with that view is, the mercurial steam-gauge, constructed on the same principle as the common barometer. M *bm* (fig. 18) is a tube containing mercury, which ought not to rise above the two points M and *m*. FG is the water reservoir. It must not contain water above the cock E, the use of which is to get rid of the surplus of water that may have been produced by condensation on some former experiment. R is an opening closed by a cock, and through which mercury or water may, when wanted, be introduced into the instrument. Lastly, C is an ajutage on which a tube is screwed, the other end of which reaches the boiler of the engine. This tube is flexible, and usually made of tin; it forms the communication of the mercurial gauge with the engine. At the point where it reaches the engine, it is screwed on an ajutage fixed to the boiler, and kept close by a cock.

To prepare the instrument for use, an additional quantity of mercury is poured into it by the aperture R, in order to be sure that the instrument contains mercury at least to the height M*m*. After this the screwbolt M is unscrewed, so that if there happen to be too much mercury it may run off. When this is done the screwbolt is replaced, and an additional quantity of water is also poured through R into the reservoir FG, and, should there be too much, it also runs off through the cock E. Then the instrument is put in communication with the boiler. The steam, arriving through the tube C in the upper part of the reservoir FG, presses on the water by virtue of its elastic force; it consequently presses the mercury down in the branch *mb* which is open at the top, until the weight of the mercury, thus raised, is equal to the pressure of the steam issuing from the boiler. A float borne on the surface of the mercury, at the point *m*, rises in proportion as that surface in the tube; and an index suspended to a thread which passes over a communication-pulley *p*, falls between the two tubes in proportion as the mercury rises in the branch *bm*, and shows upon a graduated scale the variations that occur in the level of the mercury in the different experiments. Supposing the length of the instrument from M to *b* be 6½ feet, or 78 inches, the ascending column may, if necessary, contain 156 inches of mercury; and as a column of 156 inches of mercury with a basis of 1 square inch weighs about 80 lbs., such a column may serve to measure an effective pressure amounting to 80 lbs. per square inch.

The reservoir FG is a cylinder 3 inches in diameter and 6 inches high. The use of the water it contains is to keep the branch M*b* constantly full of water, in proportion as the mercury descends in that branch. This is the reason why that reservoir is a great deal larger than the tube, and its capacity is calculated so as to be able, in case of need, to fill the whole branch. If this precaution were to be omitted, the water formed by condensation in the instrument during the experiment would fall in the tube, which being very narrow, having, for instance, no more than one-half square inch area, the water would immediately rise in it to a considerable height, and cause by that means a surplus of pressure which would make the result false. But by means of the reservoir FG, the condensation-water, in proportion as it is formed, is divided over a surface of 7 square inches, on which, consequently, it produces an imperceptible difference in height. As it is known that the pressure of the water on the unit of surface depends solely on its height, the consequence of this arrangement of the instrument is, that the surplus of pressure caused by the condensed steam is so small, that it may be neglected without any inaccuracy.

To graduate the scale of the instrument, we may begin by marking, first, the point zero. For this, the mercury and the water being poured in, as said above, the two branches must be left to communicate freely with the atmosphere, and the point where the index stops will be the point sought, for that is the position which the float naturally takes when the branch M*b* bears no more than the atmospheric pressure. If the two branches of the bent tube were to contain nothing but mercury, it is clear that the point corresponding to zero in the rising branch would be at *m*, as the mercury would in that case stand on a level in the two branches. Instead of that, the mercury in the branch M supports a certain weight of water, that is to say, the weight of the column EM; it will consequently tend to descend in that branch and to rise in the other. However, if the float is made to weigh as much as the column of water, the level will remain the same as if there were only mercury in both the branches.

The other extreme point of the scale must afterwards be marked. Let ϖ be the pressure we want to equilibrate; supposing the equilibrium established, let x be the height at which, by virtue of that same pressure ϖ, the mercury will stand above its natural level in the branch *m*. The mercury having risen in the branch *m* to the height x, it must have fallen by an equal quantity in the other branch; for the mercury added on the one side can only proceed from what has been taken off on the other. The mercury in the branch M will therefore at the same time be at the point x', and the whole part of that branch from the point x' to the point M will be filled by the water from the reservoir. If through the point x' we draw an horizontal plane, the mercury which is under that plane will equilibrate itself in two branches; we have therefore nothing to do with it, and need only consider the conditions of equilibrium for those parts which are above the plane in the two branches. Now, we have on the one side the pressure ϖ more the weight of a column of wate rhigh $Mx'=x$; and on the other side, we have a column of mercury high $2x$ more the weight of the atmosphere. P being thew eight of the column of mercury, P′ that of the column of water, and ρ that of the atmosphere, we shall have, there being an equilibrium,

$$\rho + P = P' + \varpi, \text{ or } P = P' + (\varpi - \rho).$$

$(\varpi - \rho)$, which is the surplus of the real pressure of the steam over the atmospheric pressure, is called the *effective* pressure; and all high-pressure steam engines it is this which is to be considered. The column of mercury, the weight of which we have expressed by P, having for its basis the basis of the tube which we shall express by b, and for its height the height $2x$, its volume will be $2bx$; δ representing the density of the mercury, $2\delta bx$ will be the mass of the whole column, and g expressing the accelerating force of gravitation, $2g\delta bx$ will be weight; that is to say, that we shall have

$$P = 2g\delta bx.$$

By the same reason δ' being the density of the water, the weight P′ of the column of water will be expressed by $g\delta' bx$, its basis being also b, and its height $Mx' = x$. But the density of the water being expressed by 1, that of the mercury is expressed by 13.568; thus we have

$$\frac{\delta'}{\delta} = \frac{1}{13.568} \text{ or } \delta' = \frac{\delta}{13.568}.$$

and consequently

$$P' = \frac{g\delta bx}{13.568}.$$

On the other side, the effective pressure $(\varpi - \rho)$, in whatever manner it be expressed, may be replaced by the weight of a column of mercury, that would produce the same pressure on the basis b. If then h be the height of that column, which it is easy to calculate, we shall have

$$\varpi - \rho = g\delta bh;$$

and the equation of equilibrium will thus be

$$2g\delta bx = \frac{g\delta bx}{13.568} + g\delta bh,$$

or

$$x\left(2 - \frac{1}{13.568}\right) = h.$$

This equation gives

$$x = h \times \frac{13.568}{26.136} = h \times 0.51913.$$

The height h of a column of mercury, which may represent a given pressure, is easily found; for we know that a column of mercury, one inch high, presses on its basis at the rate of 0.4948 lb. per square inch. The height of any other column may thus be proportionably calculated. If, for instance, we wish it to represent a pressure of 70 lbs., its height will be found by the following proportion:

$$\underset{\text{lb.}}{0{\cdot}4948} : \underset{\text{in.}}{1} :: \underset{\text{lbs.}}{70} : h = \frac{70}{0.4948} \times \underset{\text{in.}}{1} = \underset{\text{in.}}{141.47};$$

so, that by this value of h, x will be

$x = 141.47$ in. $\times\ 0.51913 = 6$ ft. 1½ in.; that is to say, that to correspond to an effective pressure of 70 lbs., the height of the mercury must be 6 feet 1½ inches.

The same calculation is applicable to any intermediate point that may be sought, but it would be unnecessary trouble; for, knowing the point corresponding to zero, and that which corresponds to the *maximum* pressure of the instrument, we have only to divide the interval into equal parts, and the scale will be suitably graduated, having seen that the general value of x depends solely on the corresponding value of h, and is proportional to it.

This mercurial gauge being once constructed and graduated, whenever any doubt may be entertained in regard to the pressure of an engine, nothing more is ne-

cessary than to bring it under the instrument, and by that means the pressure may be ascertained, in whatever state the valve may be at the time, whether blowing or not.

§ 2. *Of the pressure of the Steam in Locomotive Engines while travelling.*

When we make use of the mercurial gauge to discover the pressure during an experiment, attention must be given to a circumstance we are going to describe. If, the valve once regulated, the engine were to keep an equal pressure of steam during its whole journey, nothing more would be wanting than to try it once for all before starting. Having fixed the valve at the point at which we wish to work, the engine might be brought under the instrument; and the pressure being determined that corresponds to that point, provided no other alteration be made to the spring-balance of the valve, the pressure of the engine for every instant of the journey would be known.

It is thus that many persons calculate, whether or not use has been made of the mercurial gauge. When they have found that an engine lifts up its valve exactly at 50 lbs. effective pressure per square inch, that very moment the valve is considered as giving a free egress to the steam, and it is concluded thence that the steam will never rise above 50 lbs., unless the valve undergoes an alteration. Experience, however, proves that this reasoning is false.

If we observe a locomotive engine with some attention, we shall very soon see that nothing is more variable than the pressure of steam in its boiler, although the valve has undergone no alteration. If the engine runs rapidly with a moderate train, and comes to a slight inclination of the road, however small that inclination may be, it immediately produces a considerable increase of traction, because the gravity of the whole mass on the inclined plane becomes an additional resistance for the engine; and the effect of this increase of traction will be so much the more perceptible on the engine, the less the resistance was which the train offered when on the level parts of the road. It is thus that a load of one ton, which on a level road requires a traction of 8 lbs. only, presents nearly four times as much if it has to ascend an acclivity of $\frac{1}{100}$, the gravity of one ton or 22.40 lbs. on that inclination being $\frac{2240}{100} = 22.40$ lbs. The consequence of that sudden increase of resistance is therefore that the engine, as soon as it arrives at the foot of the inclined plane, must diminish considerably its velocity. Supposing that in its preceding course it spent 480 cylinders of steam per minute, and in consequence of the accidental obstacle it must overcome, it is obliged to reduce its velocity to one-third of what it was before, it will evidently spend no more than 160 cylinders per minute; nevertheless, the fire violently excited by the preceding course will continue to generate the same quantity. That steam, it is true, will be spent at a greater pressure; but experience shows that the surplus of pressure does not balance what is generated too much. The valve will therefore begin to emit an enormous quantity of superfluous steam, which in order to escape will raise the valve; but if we observe that the valve cannot rise without pressing on the spring, and consequently without augmenting the tension of the spring, we will find that the steam can only escape by increasing its pressure; and, in fact, the pressure will immediately rise on the balance several pounds per square inch, in proportion to the violence of the fire and the construction of the engine. How great then is the error committed by continuing to calculate the effective pressure at 50 lbs., because we suppose that the valve giving way at that point cannot suffer the steam to rise above it.

When the steam, in escaping, raises the valve to a given height, the greater the balance-lever is, the more the index will be displaced on the scale, and consequently, the greater will be the increase of tension of the spring; thus, in engines with a long lever, the augmentation of the pressure will be, *cæteris paribus*, more considerable than in those where the lever is shorter.

We shall soon see that the ATLAS engine, which has a short lever, with a valve of 2½ inches diameter, is able, while overcoming difficult obstacles, to raise its pressure from 53 lbs. to 56 lbs.; and that the FURY engine, which has a long lever, with a valve of 3 inches in diameter, is able, in the same circumstances, to raise its pressure from 53 lbs. to 62½ lbs. These variations in the pressure depend, in each engine, in the first place, on the augmentation of the resistance created by the obstacle or the diminution of the speed; and, in the second place, on the dimensions of the valves, levers, and balances, and the evaporating power, that is to say, the quantity of steam generated by the engine.

This increase of pressure in locomotive engines, when they meet obstacles that compel them to diminish their velocity, gives the engines with long valve-levers considerable advantage over those with short levers, whenever it is necessary to ascend an inclined plane. This advantage, it is true, is only gained by submitting the engine to a higher pressure, and might also be acquired with short lever engines by lowering the screw of the spring-balance, so as to increase the pressure in the boiler in the same proportion; but the fact itself would evidently seem the proof of a superior working, and would even be inexplicable, were we to look upon the pressure as never passing 50 lbs.

The variations in the pressure which we have just mentioned, take place while the engine is travelling, that is to say, while it is separated from the mercurial gauge. Therefore, if an engine has been working in a given circumstance, or with a known load, and that we want to ascertain at what pressure it was then working, we must write down exactly, during the experiment, the degrees successively inscribed on the balance; then, when the engine has left off working, we bring it under the mercurial gauge, and by animating the fire sufficiently to make the balance repass through all the same degrees through which it rose during the work, and by observing at the same time the mercurial gauge, we find for each of those degrees the corresponding pressure. That is the means we employed in our experiments.

We brought successively under the instrument all the engines we had made use of, and for each of them, as they all differ in some point from one another, we determined the corresponding degrees of the mercurial gauge with the divisions of the spring-balance.

RAILROAD TO CINCINNATI.—The following from the Charleston Courier of Thursday last, should incite our citizens to meet and send delegates to the Knoxville Convention.

The Charleston Courier—"We are informed that General Hayne, Chairman of the Commissioners charged with the direction of the survey of a route for the proposed road, left the city yesterday morning by the railroad, for the mountains, where Captain Williams and his brigade of engineers are now engaged in making the surveys. We also understand that Lieutenant Colcock, late of the army, who has just returned from surveying the route of a rail road from Branchville to Columbia, has been engaged by the Commissioners as an Assistant Engineer, and will proceed immediately to the mountains to join Captain Williams. Colonel Brisbane, also, who returned from the Florida campaign the day before yesterday, will, we understand, engage in the work as soon as he can make the necessary arrangements. Of the services of Col. Gadsden, the Commissioners have been deprived by his military engagements in Florida. It is still hoped, however, that he may be able to join the Commissioners in time to give them the benefit of his judgment and experience at the meeting to be held at Flat Rock on the 20th June, or, at all events, that he will be able to attend the Knoxville Convention, on the 4th July, as one of the delegates from this city. In consequence of the information given by Gen. Hayne to the meeting of citizens on Saturday last, of the astonishing performance of locomotive engines on the Baltimore and Ohio Railroad—overcoming (as stated in the public prints) *acclivitiss of upwards of* 200 *feet*—it has been determined to request some of our delegates to proceed to Baltimore, to obtain the necessary information to be laid before the Convention at Knoxville, on the 4th July. We believe that one or two of the gentlemen composing the delegation, have consented to perform this important and interesting duty, and we have no doubt that others will unite in it, if it should be deemed necessary.

The following interesting article on iron railroads in France, is extracted from the *Journal de l Industriel et du Capitaliste*:—

"Three grand undertakings especially occupy at this moment the attention of speculators, namely, iron railroads from Paris to Rouen and the sea, from Paris to Orleahs, and from Paris to Lille. Several lines have been proposed to join Paris to Rouen and the sea. The line surveyed by the administration passes by the side of Pontoise, traverses Gisors, goes from thence to the Bosc-le-Hard, and from that point proceeds on the right by the valley of la Saye to the Dieppe, and from the same point on the left to Havre. A branch passing by Blainville would reach Rouen near

the Boulingrin, after having passed through a tunnel of 2,796 metres. M. Mellet had proposed, before the engineers of the Ponts-et-Chausees, a line to Rouen, which like the preceding, would pass by Gisors and Charleval, but which from that point would follow the valley of the Andelle, and afterwards run along the Seine to Rouen.—Lastly, Messrs. Polonceau and Bellange, propose a line quite different from the former two, which would keep on the left bank of the Seine, and after passing by Poissy, Mantes, and Vernon, would pass the river at two points, Criquebœuf and Oissel, and arrive at Rouen in the Place de St. Sever. After having quitted Rouen, where it would again cross the Seine, the railroad would take the valley of Deville, as far nearly as Houlme, where it would divide into two parts; the one would proceed to the valley of Arques, near Rosay, in order to reach Dieppe; the other would rejoin the Seine at Duclair, by the valley of Austraberthe, and would then follow the right bank of the river to Havre. Lines not less different from each other, have been presented for the railroad from Paris to Orleans. A first, by the valleys of the Seine and the Essone; a second by the valley of the Seine, la Ferte-Aleps, Artenay, and Gidy; a third by the valleys of the Seine, the Orge, and the Renarde, Anton, and Toury; and a fourth by Versailles, St. Hubert, the wood of Ram bouillet, the hamlet of Therinille, the forests of Ivelines and Souchamp, and Artenay. As to the Lille railroad, two lines have been surveyed by M. Vallee, chief engineer of the Ponts et Chausses, the one by Amiens, and the other by St. Quentia, with branches to Valenciennes, Boulogne, and Calais. We may add that other lines less extended are in contemplation. The iron railroad from Alais to Beaucaire is on the point of being commenced. A grant of permission for another, from Cette to Montpellier, has been applied for. The projected road from Bourg to Lyons, as laid down by M. Hageau, is about to be again taken into consideration. It is also said that a road from Elbeuf to Louviers is about to be undertaken, a part of the funds being already subscribed."

AN ACT

TO INCORPORATE THE NEW-YORK AND ALBANY RAILROAD COMPANY.

Passed April 17, 1832.

The People of the State of New-York, represented in Senate and Assembly, do enact as follows:

§1. Nicholas Fish, Elisha Tibbits, Samuel Swartwout, Benjamin Wright, William C. Redfield, James B. Murray, William M. Price, David D. Field, Alexander E. Hosack, Henry Hone, Samuel G. Wheeler, Campbell P. White, Jesse Oakley, Isaiah Townsend, John T. Norton, John P. Cushman, William Aikin, Abraham P. Holdridge, James Vanderpoel, Joel Benton, Albro Aikin, Robert Sedgwick, Charles Henry Hall, John Townsend, Benjamin Knower, Abraham Bockee, Townsend McCoun, John Hone, Cornelius Harsen, Lynde Catlin and Gideon Lee, with such other persons as shall associate with them for that purpose, are constituted a body politic and corporate by the name of "The New-York and Albany Railroad Company," with power to construct a single, double, or treble railroad or way betwixt the cities of New-York and Albany, commencing on the island of New-York where the Fourth avenue terminates at the Harlæm river, and passing through the counties of Westchester, Putnam, Dutchess, Columbia and Rensselaer, and ending at some point on the said river Hudson, opposite or near the city of Albany, with power to continue and extend the same to the city of Troy; and with power also to construct a branch or branches to the eastern limits of each or any county or counties, within this State, into which the said Railroad may enter, where such branch or branches shall be necessary to connect said main road with any Railroad already or hereafter to be constructed in either of the States of Massachusetts or Connecticut, to transport, take and carry property and persons upon the same, by the power and force of steam, of animals, or of any mechanical or other power, or of any combination of them, for the term of fifty years from the passage of this act, and the whole of the said road shall be made within this State.

§2. If the corporation hereby created, shall not, within three years from the passage of this act, commence the construction of said Railroad or way, and spend at least the sum of two hundred thousand dollars thereon, and shall not, within ten years from the passage of this act, construct, finish and put in operation, the said single, double or treble Railroad or ways, then the right of the said corporation shall be null and void: and if a sufficient amount of the stock of the said company shall be subscribed within the county of Rensselaer to construct and continue the Railroad from the village of Greenbush to the compact part of the city of Troy, then the said company shall construct and continue said Railroad to the said city of Troy, within four years after said amount of stock shall be subscribed therefor.

§3. The capital stock of the said company shall be three millions of dollars, and shall be divided into shares of one hundred dollars each, and shall be deemed personal property, and transferable in such manner as the said corporation shall by by-laws direct.

§4. Daniel Le Roy, Walker Todd, Enos Hopkins, Thomas Taber, 2nd., Cornelius Harsen, James B. Murry, Jess Smith, William Jay, John Townsend, John T. Norton, Benjamin Knower, Townsend McCoun, Gideon Tucker, William Aikin, Abraham P. Holdridge, Rufus Reed, Albro Aikin, Elisha Tibbits, Samuel Swartwout, John Hone, Lynde Catlin, John Lozier, Gideon Lee, John Snyder, Augustus Tremain, Walter Cunningham, and Elias Pattison shall be commissioners; the duty of whom it shall be, within the period of six months after the passing of this act, at some suitable place in the cities of New-York, Albany and Troy, and in the town of Amenia, in the county of Dutchess, to open books to receive subscriptions to the capital stock of the said corporation; and twenty days public notice shall be given by the said commissioners of the time and place of the opening of such books in one of the public newspapers in each of the said cities, and in the county of Dutchess; and as soon as the same shall be subscribed, to give a like notice for a meeting of the stockholders at such time and place as the said commissioners shall appoint, to choose seventeen directors; and such election shall be then and there made by such of the stockholders as shall attend for that purpose, either in person or by lawful proxy; each share of the capital stock entitling a stockholder to one vote; and the said commissioners shall be inspectors of the first election of directors of the said corporation, and shall certify, under their hands, the names of those duly elected, and deliver over the subscription books to the said directors, and the time and place of holding the first meeting of directors shall be fixed by the said commissioners; and the said directors shall have power to appoint an engineer, and to cause such examinations and surveys for the said Railroad to be made, as may be necessary to the selection by them of the most advantageous line, or lines for the location of the road; and the said directors shall, after such examinations and surveys shall be made, select, and by certificates under their hands and seals, designate the line, course or way which they may deem most advantageous for the said Railroad; one of which certificates shall be filed in the office of the Register of the city of New-York, and one in the office of the clerk of each of the counties through which the said road shall pass; which line, course or way so selected and certified shall be deemed the line, course or way, on which the said corporation shall construct, erect, build or make their single, double, treble Railroad or ways, as hereinafter mentioned, the expenses of all which surveys and examinations, and all manner of incidental expenses relating thereto, shall be paid for by the said corporation.

§5. If within three days after opening the subscription books as aforesaid, a sum exceeding three millions of dollars shall be subscribed, the commissioners shall proceed to apporeion the stock among the subscribers, and shall complete the apportionment within sixty days after the opening of said subscription, and if the full amount of capital be not subscribed within three days as aforesaid, then it shall be the duty of the commissioners to open the subscription books from time to time, until the whole amount shall have been subscribed. The commissioners shall receive no subscription unless five dollars on each share subscribed be paid at the time time of subscription.

§6. The said directors to be chosen at such meeiing, or at such annual election, shall, as soon as may be, after every election, choose out of their own number one President, and one other person to be Vice-President; and in case of the death, resignation or absence of the President, the Vice-President shall preside until the next annual election thereafter, or until another President shall be chosen; and in case of the death or resignation of the President or Vice-President, or of any director, such vacancy or vacancies may be filled for the remainder of the year by the board of directors; and in case of the absence of the President and Vice-President, the board of directors shall have power to appoint a President pro tempore, who shall have and exercise such powers and functions as the by-laws of the said corporation may provide.

§7. In case it should at any time happen that an election of directors shall not be made on any day, when pursuant to this act it ought to have been made, the said corporation shall not, for that cause, be deemed to be dissolved; but such election may be held at any other time within sixty days thereafter.

§ 8. The directors shall have full power to make and prescribe such by-laws, rules and regulations as to them shall seem needful and proper, touching the management and disposition of the stock, property, estate and effects of the said corporation, the transfer of shares, and touching the duties and conduct of their officers, servants, and election of directors, and all other matters whatsoever which may appertain to the concerns of the said corporation; and also shall have power to appoint a Secretary and as many clerks and servants as to them shall seem meet, and to establish and fix such salaries and allowances to them, and also to the President and Vice-President, as to the said board shall appear proper. The said corporation is hereby empowered to purchase, receive and hold such real estate as may be necessary and convenient in accomplishing the objects for which this incorporation is granted, and may, by their sgents, surveyors and engineers, enter upon such route, place or places, to be designated as aforesaid by the said directors as the line, course, road or way, whereon to construct the said Railroad or ways; and it shall be lawful for the said corporationito enter upon, and take possession of, and use all such lands and real estate as may be indispensable for the construction and maintenance of the said single, double or treble Railroad or ways, and the accommodations requisite and appertaining unto them; and may also receive, hold and take all such voluntary grants and donations of land and real estate as shall be made to the said corporation, to aid in the construction, maintenance and accommodation of the said Railroad or ways; but all lands or real estate thus entered and taken possession of, and used by the said corporation, and which are not donations, shall be purchased by the said corporation, of the owner or owners of the same, and at a price to be mutually agreed upon between them; and in case of a disagreement of price, and before the making of any portion of the road upon said land, the directors of the said corporation may present their petition to the Chancellor or Vice-Chancellor of the circuit in which such lands are situated, setting forth the necessity of such lands for making said Railroad or ways, and of the attempt and failure to purchase the same, with the name and residence of the owner, and the reason why the purchase cannot be made; and the Chancellor or Vice-Chancellor shall direct such notice to the owner or owners of such land as he shall deem proper and reasonable, of the time and place of hearing the parties; and upon proof of due service of such notice, and upon hearing the parties, the Chancellor or Vice-Chancellor shall appoint three competent and disinterested freeholders of the county in which the lands are situated, to be commissioners to appraise said lands. The said commissioners shall appraise said lands, and shall award to the owner or owners thereof what they shall deem to be the full value of the same; and shall be authorized to examine the lands, to administer oaths, and hear testimony; and shall make their appraisement in writing without delay, under their hands, with a minute and accurate description of the lands appraised, with a map thereof, and shall report the same, with the testimony taken, to the Court of Chancery. The Chancellor or Vice-Chancellor shall examine the report and shall hear the parties, if desired, and may increase or diminish the amount awarded, if he shall be satisfied injustice has been done. Upon proof to the Chancellor or Vice-Chancellor, within thirty days after his determination, of payment to the owner, or of the depositing to the credit of the owner in such bank as the said Chancellor or Vice-Chancellor shall direct, of the amount of such appraisement, and the payment of all expenses attending it, the said Chancellor or Vice-Chancellor shall make a decree or order, particularly deseribing the lands and reciting the appraisement and the mode of making it, and all other facts neceesary to a compliance with this [section] of this act; and when the said decree or order shall be recorded in the office of the clerk of the county in which the land is situated, whose duty it shall be to record the same, the said corporation shall be possessed of all such lands, for the purpose of the said road, and may enter upon and take possession, and use the same. In case any married woman, infant, idiot, insane person, or non-resident, who shall not appear after such notice, shall be interested in any such land, the said Chancellor shall appoint some competent and disinterested person to appear before the said commissioners, and act for and in behalf of such married woman, infant, idiot, insane person, or non-resident.

§ 9. The said corporation is hereby authorised to construct, erect, build, make and use, a single, double or treble Railroad or ways, of suitable width and dimensions, to be determined by the said corporation, on the line course or way designated by the directors as aforesaid, as the line, course or way whereon to construct, erect, build and make the same; and shall have power to regulate the time and manner in which goods and passengers shall be transported, taken and carried on the same, and shall have power to erect and maintain toll-houses and other buildings for the accommodation of their concerns as they may deem suitable to their interests.

§ 10. Whenever it shall be necessary for the construction of their single, double or treble Railroad or way, to intersect or cross any stream of water or water courses, or any road or highway betwixt the places prescribed by the first section of this act, it shall be lawful for the said corporation to construct their way or ways across or upon the same; but the corporation shall restore the stream or water course, or road, or highway thus intersected, to its former state, or in a sufficient manner not to have impaired its usefulness.

§ 11. It shall be lawful for the owners of the land over which said Railroad shall be constructed, to cross the said Railroad with his or her servants, cattle, teams and carriages, for the purpose of using and managing their respective farms, over which the said Railroad shall pass, doing no unnecessary damage to said Railroad.

§ 12. It shall be lawful for the company hereby incorporated, from time to time to fix, regulate and receive the tolls and charges by them to be received for transportation of property or persons on the single, double or treble Railroad or ways aforesaid, hereby authorised to be constructed, erected, built, made and used.

§ 13. If any person shall wilfully do or cause to be done, any act or acts whatever, whereby any building, construction or work of the said corporation, or any engine, machine or structure, or any matter or thing appertaining to the same shall be stopped, obstructed, impaired, weakened, injured or destroyed, the person or persons so offending shall be deemed guilty of a misdemeanor, and shall forfeit and pay to the said corporation double the amount of damages sustained by means of such offence or injury, to be recovered in the name of the said corporation, with costs of suit, by action of debt.

§ 14. It shall be lawful for the directors to require payment of the sums to be subscribed on the capital stock, at such times, and in such proportions, and on such conditions, as they shall deem fit, under the penalty of the forfeiture of all previous payments thereon; and shall give notice of the payments thus required, and of the place and time when the same are to be paid, at least thirty days previous to the payment of the same, in a public newspaper published in the cities of New-York, Hudson, Albany and Troy, and in the villages of Poughkeepsie and Newburgh, and also in one of the public newspapers in the county of Westchester.

§ 15. The said corporation shall possess the general powers, and be subject to the general restrictions and liabilities prescribed by such parts of the eighteenth chapter of the first part of the Revised Statutes, as are not repealed.

§ 16. The directors of said company shall make an annual report, in detail, of their proceedings and expenditures, verified by the affidavit of at least two of them, which report shall be filed in the office of the Secretary of State; and in like manner shall, at the expiration of each year, for the term of fifteen years after the completion of said road, file in said office a detailed statement of tolls received on such Railroad, and of all monies expended by said company, for repairs or otherwise, for the purpose of said Railroad.

§ 17. If the Legislature of this state shall, at the expiration of ten and within fifteen years from the completion of said Railroad, make provision by law for the re-payment to the said corporation of the amount expended by them in the construction of said Railroad, together with all monies expended by them for permanent fixtures for the use of said Railroad, with interest on such sums, at the rate of fourteen per centum per annum, together with all monies expended by said company, for repairs or otherwise, for the purposes of said road, after deducting the amount of tolls received on said road, then the said Railroad, with all fixtures and appurtenances, shall vest in and become the property of the people of this State.

§ 18. For the purpose of continuing the branches of said Railroad into the States of Connecticut and Massachusetts, the corporation shall have and possess, with the consent of the Legislatures of those States, the same powers, privileges and authority, as have by this act been given for the construction and management of the main Railroad.

§ 19. The Legislature may at any time alter, amend, modify or repeal this act.

AN ACT TO AMEND AN ACT ENTITLED "AN ACT TO INCORPORATE THE NEW-YORK AND ALBANY RAILROAD," PASSED 17TH APRIL, 1832,

Passed May 9, 1836.

The People of the State of New-York, represented in Senate and Assembly, do enact as follows:

§ 1. The time for commencing the construction of the New-

York and Albany Railroad is hereby extended for two years from the passage of this act.

§ 2. Charles Henry Hall, Gideon Lee, Isaac Adriance, Benson McGowan, John Harris, Francis Fickett, Lewis Morris, Jeremiah Anderson, Albro Aikin, Taber Belden, Ebenezer Foster, Stephen Warren, James Van Schoonhoven, Thomas W. Olcott, and Samuel Cheever shall be commissioners for opening books to receive subscriptions to the capital stock of said company, instead of those named in the act of incorporation, but with the like powers and subject to the like duties.

§ 3. It shall and may be lawful for the said commissioners, within six months after the passage of this act, giving the notice required by said act of incorporation, to open books to receive subscriptions to the capital stock of the said company; and as soon as one million of dollars shall be subscribed, and the first instalment thereon paid in, to give like notice for a meeting of the stockholders for the purpose of electing directors.

§ 4. The said company are hereby authorised, after they shall have completed not less than thirty miles of said road in the county of Westchester, to commence the said road upon the island of New-York, with the consent of the corporation of the city of New-York, and to construct the same in such sections as they may deem most eligible, and as fast as they may obtain means for so doing; and such portion of said Railroad as may be so constructed shall be vested in said company, for and during the period allowed in the original act of incorporation; and nothing in this act shall be so construed, as to infringe such rights and privileges as the Harlæm bridge company possess, by virtue of any statute of this State, nor shall any construction be given to this act to confer any rights or privileges on said Harlæm bridge company, other than it now has.

§ 5. The corporation hereby created shall possess and enjoy all the privileges and provisions which are granted to and made in favor of the corporation created by the act entitled "An Act to provide for the construction of a Railroad from Attica to Buffalo," passed May 3d, 1836, and shall be subject to all the conditions and restrictions which by the act aforesaid are imposed upon the corporation therein referred to, except as herein provided.

§ 6. Any application to be made to a Vice-Chancellor under this act, shall be made to the Vice-Chancellor of the circuit in which the land proposed to be taken shall be situated. All notices and meetings required in the act above referred to, shall be published and held in one of the counties through which the said Railroad hereby authorised, is to be made.

§ 7. The said corporation is hereby authorised to construct a single, double or treble Railroad, of suitable width and dimensions, to be determined by the said corporation, on the course designated by the dierctors as aforesaid, and shall have power to regulate the time and manner in which goods and passengers shall be transported, taken and carried on the same; and shall have power to erect and maintain toll-houses, and other necessary buildings for the accommodation of their concerns. The said corporation shall not charge or receive a greater sum than at the rate of five cents per mile for the transportation of any passenger and his ordinary baggage.

§ 8. Whenever it shall be necessary, for the construction of their said road, to intersect or cross any stream of water or water courses, or any road or highway between the places prescribed by this act, it shall be lawful for the said corporation to construct their road across, or upon the same; but the corporation shall restore the stream or water courses, or road or highway thus intersected, to its former state, or in a sufficient manner not to have impaired its usefulness; and shall, moreover, erect and maintain sufficient fences upon the sides of the route of their said road; but nothing in this act, or the act hereby amended, shall be so construed as to authorise the construction of a bridge across the Hudson river.

§ 9. Whatever damages the Canaan and Union Village turnpike road company may sustain by the depreciation of their stock in said road, or otherwise, in consequence of the making and using the said Railroad, may be appraised as prescribed by the seventh section of the act herein above referred to, upon the application of the said Railroad company; and they may enforce the collection of the said damages so appraised against the said Railroad company in any court of law or equity. The said damages shall not be appraised as aforesaid until eighteen months after the said Railroad shall be made and put in operation.

§ 10. The second section of the act hereby amended shall be so modified as to read as follows, viz: If the corporation hereby created shall not, within three years after the passage of this act, commence the construction of said Railroad or ways, and expend at least the sum of two hundred thousand dollars thereon, then the right of said corporation shall be null and void. Such parts of the act hereby amended as may be inconsistent with the provisions of this act are hereby repealed.

§ 11. The Legislature may at any time alter modify or repeal this act.

STATE OF NEW YORK,
Secretary's Office, }

I have compared the preceding with an original act of the Legislature of this State, on file in this office, and do certify, that the same is a correct transcript therefrom, and of the whole of said original.

ARCH'D. CAMPBELL,
Dep. Secretary.

Albany, May 11, 1836.

AN ACT

TO PROVIDE FOR THE CONSTRUCTION OF A RAILROAD FROM ATTICA TO BUFFALO.

Passed May 3d, 1836.

The People of the State of New-York, represented in Senate and Assembly, do enact as follows:

§ 1. All persons who shall become stockholders pursuant to this act, shall be, and they are hereby constituted a body politic and corporate, for the term of fifty years, by the name of "The Attica and Buffalo Railroad Company," for the purpose of constructing and maintaining a Railroad between the village of Attica, in the county of Genesee, and the city of Buffalo, in the county of Erie, commencing in the village of Attica at the termination of the Tonawanda Railroad, and running thence to the city of Buffalo, on such route as a majority of the directors of said company shall determine to be best adapted to the public accommodation, and take, transport, carry and convey property and persons upon the same, by the power and force of steam, of animals, or any mechanical power, or of any combination of them.

§ 2. If the said corporation shall not, within two years from the passage of this act, commence the construction of the said road, and expend at least the sum of twenty-five thousand dollars thereon, and shall not within four years from the passage of this act, finish the said road and put the same in operation, then the said corporation shall thenceforth forever, cease, and this act shall be null and void.

§ 3. The capital stock of the said corporation shall be three hundred and fifty thousand dollars, which shall be divided into shares of fifty dollars each: which shares shall be deemed personal property, and be transferred in such manner as the said corporation shall in its by-laws direct.

§ 4. George Cooley, James Douglass, Alden S. Stevens, Pierre A. Barker, John W. Clark, James Stryker, Moses Disbrow, Robert Earll, Guy H. Goodrich, Israel T. Hatch, Charles Gardner, Morgan L. Faulkener, and Elijah Ford, shall be commissioners, whose duty it shall be, within one year after the passage of this act, at some suitable place in the village of Attica and in the city of Buffalo, and in such other places as they, or a majority of them shall direct, to open books to receive subscription to the capital stock of the said corporation; and thirty days' public notice shall be given by the said commissioners of the time and place of the opening of such books, in one of the public newspapers in the said village and city, and in the state paper; and the said commissioners shall, at the time of any subscription, require the payment to them by the person or persons subscribing, of ten dollars towards and upon every hundred dollars so subscribed; and unless the same shall be paid, the subscription shall be invalid: and in case a greater amount in the whole shall be subscribed, than three hundred and fifty thousand dollars, the said commissioners shall distribute the stock in such manner as a majority of them shall deem most advantageous to the public interest: but in case the capital stock of said corporation shall not all be subscribed, then the said commissioners shall be authorized to re-open the said books, at such other times and places, and in such manner, and after such notice, as they, or a majority of them, shall direct; and whenever the said capital stock shall have been subscribed, and distribution made as aforesaid, or as soon thereafter as practicable, it shall be the duty of the said commissioners to give thirty days' notice, in a public newspaper, in each of the counties aforesaid, and in the state paper, for a meeting of the stockholders, at such time and place as the said commissioners, or a majority of them, shall appoint, to choose thirteen directors; and such election shall be then and there made by such of the stockholders as shall attend for that purpose, either in person or by lawful proxy; each share of the capital stock owned by a citizen of the United States, entitling a stockholder to one vote: and the said commissioners shall be inspectors of the first election of directors of the said corpora-

tion, and shall certify, under their hands, the names of those duly elected, and deliver over the subscription money and books to the said directors; and the time and place of holding the first meeting of the directors shall be fixed by the said commissioners. And the said directors shall cause such examinations and surveys for the said Railroad to be made, as may be necessary to the selection by them of the most advantageous course for the said road, from the village of Attica to the city of Buffalo; and the said directors shall, after such examinations and surveys shall have been made, select, and by certificates under their hands and seals, designate the course which they shall deem most advantageous for the said road; one of which certificates shall be filed in the office of the clerk of each of the counties aforesaid, through which the said road shall pass; and the course so selected and certified, or as altered in the manner hereinafter provided, shall be deemed the course on which the said corporation shall construct the said road as hereinafter mentioned. But any person through whose lands the line of said road shall be designated, who may consider himself the aggrieved thereby, may, within thirty days after receiving written notice of the filing of the certificate as aforesaid, apply to the Vice-Chancellor of the eight circuit, setting forth the nature of his grievance and his objections to the route designated; and it shall be the duty of the said Vice-Chancellor, if he considers sufficient cause therefor to exist, to appoint three disinterested persons, one of whom shall be a practical engineer, as commissioners. The said commissioners, or a majority of them, including said engineer, shall have power, after the examination thereof, and hearing of the parties, to affirm or alter the course of the said road through the said lands, as they may deem consistent with the just rights and interests of the said parties and the public. The determination of the said commissioners shall, within thirty days after their appointment, be made and certified by them, and the certificate filed in the office of the clerk of the county as aforesaid. The said Vice-Chancellor shall be entitled, in each case, on receiving the application for his services in the premises, to a fee of five dollars; and the said commissioners shall be entitled to a compensation of three dollars each, per day, for their services, to be paid by the person making the application: and in case the said course thus previously designated, shall be altered by said commissioners, the said company shall refund to said applicant, the fees and compensation paid by him as aforesaid, to be recovered in an action for money had and received, in any court having cognizance of the same.

§ 5. The first directors to be chosen shall hold their offices until the first Monday in June, in the year next succeeding their election, and until others shall be chosn; and every election of directors thereafter, shall be annually on the first Monday in June in each and every year, at such time and place in either of the counties aforesaid, as the said directors shall appoint, giving thirty days previous notice in the manner prescribed for giving notice by the commissioners for the opening of the books. Every such election shall be held under the inspection of five stockholders not being directors, who shall be previously appointed by the board of directors. All elections shall be by ballot, and a plurality of the votes shall constitute a choice: one at least of said directors shall reside in each of the counties before mentioned. In case of an equal number of votes for any two or more directors, the directors shall by ballot determine who shall be entitled to a seat at the board; every stockholder, being a citizen of the United States, shall be entitled to one vote, personally or by proxy, on every share held by him thirty days previous to such election.

§ 6. In case it should at any time happen that an election of directors shall not be made on any day when pursuant to this act it ought to have been made, the said corporation shall not for that cause be deemed to be dissolved; but such election may be subsequently made; and the directors chosen for the year preceding, shall hold their seats at the board until such election shall be made.

§ 7. The said corporation is hereby authorized to construct a single or double road, of suitable width and dimensions, to be determined by the said corporation, on the course designated by the directors as aforesaid; and shall have power to regulate the time and manner in which goods and passengers shall be transported, taken and carried on the same; and shall have power to erect and maintain toll-houses and other necessary buildings for the accommodation of their concerns. The said corporation shall not charge or receive a greater sum than at the rate of three cents per mile for the transportation of any passenger and his ordinary baggage.

§ 8. In case any married woman, infant, idiot, or insane persons, or non-resident of the State, who shall not appear after such notice, shall be interested in any such land or real estate, the said judge shall appoint some competent and disinterested person to appear before the said commissioners, and act for and in behalf of such married woman, infant, idiot, insane person or non-resident.

§ 9. The corporation is hereby empowered to purchase, receive and hold such real estate as may be necessary for accomplishing the objects for which it is granted; and may, by their agents, surveyors and engineers, enter upon and take possession of and use, all such lands and real estate as may be indispensable for the construction and maintenance of their single or double Railroad or way, and the erection of buildings necessary for the stationary engines; and may also receive, hold and take, all such voluntary grants and donations of land and real estate, for the purpose of said road, as shall be made to the said corporation, to aid in the construction, maintenance and accommodation of the said road; but all lands or real estate thus entered upon, which are not donations, shall be previously purchased by the said corporation of the owner or owners of the same, at a price to be mutually agreed upon between them; and in case of any disability on the part of the owners of such lands, to contract or sell the same, on account of insanity, infancy or otherwise, refusal to sell, or disagreement as to price, and before making any portion of said road on said land, the said corporation shall present a petition to the first or senior judge of the county in which such land may lie setting forth the necessity of such land for the making of said road, and the failure to obtain the same by agreement, with the reasons thereof, and the name and residence of each owner, if known, together with a map, plan and profile of the road, and praying for the appointment of a jury of appraisers. The said judge shall thereupon direct reasonable notice in writing to be given to the owners of such lands, of the time of drawing such jury, which shall be at the clerk's office in the county where the lands are situate, and upon due proof thereof, and hearing the parties, or such of them as may attend and object to the regularity of the proceedings on the part of the said corporation, such judge, together with the clerk of said county, shall draw from the grand jury box of the county, the names of twelve competent and disinterested jurors, who, by an order to be made by such judge and entered in the common rule book of the court of common pleas, shall be appointed appraisers of the damage to be sustained by such owners in the construction of such road; and should any person or persons so designated, refuse or neglect to serve on said jury, or be disqualified, the vacancy or vacancies shall be filled by the said judge in manner aforesaid.—Said appraisers shall, before entering upon the duties of their office, take the oath prescribed by the sixth article of the constitution. The said judge shall appoint a time and place for said appraisers to meet, and shall cause due notice in writing to be served upon such owners, or in case of absence, to be left at their usual place of residence, if within the county, and if not to be put up in some conspicuous place on the premises, of the time and place of meeting for the purpose of completing said appraisement, and shall also cause due notice to be given to the said appraisers of the time and place of meeting; and said appraisers shall at such time proceed to view the premises; they shall have power to examine witnesses under oath, which oath any one of the said appraisers is hereby authorised to administer, and shall, without fear, favor or partiality, assess the value of the land taken, and the damages such owners may sustain by the taking of their lands, by injury to buildings, and in the construction of such road, without any deduction on accouut of any real or supposed benefit or advantage which such owners of such lands may derive by the construction of such road. They shall make an inquisition or certificate of their appraisement, specifying the items appraised, which shall be signed by a majority of them, and contain a minute and accurate description of the land appraised, with a map thereof, and shall present the same, with the testimony taken, to the county clerk, who shall file them in his office. The ballots drawn from the jury box shall be replaced by the county clerk. Upon proof to the said judge, within thirty days after the filing of the inquisition of the jury, of payment to the owner or owners, or of the depositing to their credit, in such bank as the judge shall direct, of the amount of such appraisement, and of all costs and expenses attending it, including reasonable counsel fees, (to be taxed and certified by said judge,) the judge shall make an order particularly describing the land, and reciting the appraisement and the mode of making it; which order shall be recorded in the office of the clerk of the county in which the land is situated, in like manner as if the same were a deed of conveyance; and the said corporation shall thereupon become possessed of such land, during the continuance of the corporation and may use the same for the purpose of said road. This section shall not be so construed as to prevent any individual through whose land said road may run, from the right of crossing the same at suitable and convenient places, for farming and other necessary purposes, nor to authorise the said corporation to take, except by agreement with the owner thereof, any timber, stone, or other

materials on any land, except that on which the said Railroad or way shall be constructed. Nor shall the corporation hereby created, enter upon or take possesson of lands belonging to any association of individuals formed under the act of the last session of the legislature, whose lands have been purchased for the purpose of constructing a Railroad thereon, except such as is hereinafter provided. The compensation of the appraisers shall be determined by the said first or senior judge at a sum not exceeding two dollars per day, in addition to their reasonable disbursements, to be paid by the said corporation. Whenever the verdict of the appraisers shall not exceed the sum tendered by the corporation for the lands proposed to be taken, in such case the corporation shall not be compelled to pay any costs or expenses to the owner of the property appraised, except to such owners as named in the eighth section.

§ 10. The said directors may make and establish such by-laws, rules and regulations as shall from time to time appear necessary for the good government of the said corporation, and the preservation and due management of their property, interest and affairs.

§ 11. Whenever it shall be necessary for the construction of their said road to intersect or cross any stream of water or water courses, or any road or highway, between the places prescribed by the first and fourth sections of this act, it shall be lawful for the said corporation to construct their road across or upon the same; but the corporation shall restore the stream or water course or road or highway thus intersected, to its former state, or in a sufficient manner not unnecessarily to have impaired its usefulness; and shall moreover, erect and maintain sufficient fences upon the sides of the route of their said road.

§ 12. It shall be lawful for the said company, from time to time, to fix, regulate and receive the tolls and charges by them to be received for transportation of property or persons on the said road, subject to the restrictions before mentioned.

§ 13. If any person or persons shall wilfully do or cause to be done, any act or acts whatever, whereby any building, construction or work of the said corporation, or any engine, machine or structure, or any matter or thing appertaining to the same, shall be stopped, obstructed, impaired, weaked, injured or destroyed, the person or persons so offending shall be guilty of a misdemeanor, and shall forfeit and pay to the said corporation treble the amount of damages sustained by means of such offence or injury, to be recovered in the name of the said corporation, with costs of suit, by action of debt.

§ 14. It shall be lawful for the directors to require payment of the sums to be subscribed to the capital stock, at such times, and in such proportions, and on such conditions, as they shall see fit, under the penalty of the forfeiture of their stock, and of all previous payments thereon; and they shall give notice of the payments thus required, and of the place and time, when and where the same are to be paid, at least thirty days previous to the payment of the same, in the paper published by the state printer, and in one newspaper in each village and city herein mentioned.

§ 15. The said corporation shall possess the general powers, and be subject to the general liabilities and restrictions prescribed by such part of the eighteenth chapter of the first part of the Revised Statutes, as are not repealed.

§ 16. The directors of said company shall make an annual report in detail of their proceedings and expenditures, verified by the affidavits of at least two of them; which report shall be filed in the office of the Secretary of State; and in like manner shall, at the expiration of each year after the completion of said road, file in said office a detailed statement of tolls received on such road, and of all moneys expended by said company for repairs or otherwise for the purposes of said road.

§ 17. If the Legislature of this State shall, after the expiration of ten, and within fifteen years from the completion of said road, make provision by law for the repayment to the said company of the amount expended by them in the construction of said road, together with all moneys expended by them for permanent fixtures for the use of said road, with interest on such sums, at the rate of ten per cent per annum, together with all moneys expend- by said company for repairs or otherwise, for the purposes of said road, after deducting the amount of tolls received on said road, then the said road, with all its fixtures and appurtenances, shall vest in, and become the property of, the people of this State.

§ 18. It shall be lawful for the company hereby incorporated, to cross, intersect, join or unite with any Railroad company, canal company, or private company, when associated under any law of this State, for the purpose of constructing a Railroad on lands purchased for that purpose, at any point which the directors of the said companies may think advisable, on such terms as the directors of the two companies respectively may agree upon: and in case of disagreement between the directors of said companies, then at such point, and upon such terms, as the court of chancery of this State shall determine to be equitable and just between the said companies.

§ 19. The said company shall, at regular times, when they start or run their cars, be required to supply sufficient accommodation for public convenience, and shall carry and transport all the passengers and their property, or either, for those who may demand the same at the place of starting, within a reasonable time previous thereto, or when the car or cars shall pass at the junction of any other Railroad, or at any point where a siding shall be constructed for the accommodation of any part of the country, on the due payment of the customary tolls provided for by this act and the bye-laws of said corporation: and in case the said company or its agents shall refuse or neglect so to do, the said corporation shall then be liable to the person or persons aggrieved, for such amount of actual damage as may have been sustained by him or them, to be recovered by suit at law with costs.

§ 20. It shall be the duty of the said company, when applied to by the postmaster-general, to convey the mails of the United States on the said road, and in case they shall not agree with him as to the rate of compensation therefor, and as to the time, manner and condition of carrying the same, it shall be lawful for the Governor of this State to appoint three commissioners, who, or a majority of them, after fifteen days notice in writing to said company, shall determine and fix the prices, terms and conditions aforesaid.

§ 21. If consequential damages shall happen after the construction of said road, not foreseen by the appraisers, and not taken into the estimate on the first appraisal, or in the amount paid by the said company where the lands have been purchased, any person whose lands or buildings shall be injured by such consequential damages, may apply for and have the same appraised under the ninth section of this act, in the manner provided therein.

§ 22. The legislature may at any time alter, modify or repeal this act.

FRAME BRIDGES.

THE subscriber would respectfully inform the public, and particularly Railroad and Bridge Corporations that he will build Frame Bridges, or vend the right to others to build, on Col. Long's Patent, throughout the United States, with few exceptions. The following sub-Agents have been engaged by the undersigned who will also attend to this business, viz.

Horace Childs,	Henniker, N. H.
Alexander McArthur,	Mount Morris, N. Y.
John Mahan,	do do
Thomas H. Cushing,	Dover, N. H.
Ira Blake,	Wakefield, N. H.
Amos Whitemore, Esq.,	Hancock, N. H.
Samuel Herrick,	Springfield, Vermont.
Simeon Herrick,	do do
Capt. Isaac Damon,	Northampton, Mass.
Lyman Kingsly,	do do
Elijah Halbert,	Waterloo, N. Y.
Joseph Hebard,	Dunkirk, N. Y.
Col. Sherman Peck,	Hudson, Ohio.
Andrew E. Turnbull,	Lower Sandusky, Ohio.
William J. Turnbull,	do do
Sabried Dodge, Esq.,	(Civil Engineer,) Ohio.
Booz M. Atherton, Esq.	New-Philadelphia, Ohio.
Stephen Daniels,	Marietta, Ohio
John Rodgers,	Louisville, Kentucky.
John Tililson,	St. Francisville, Lous'a.
Capt. John Bottom,	Tonawanda, Penn.
Nehemiah Osborn,	Rochester, N. Y.

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the National road in Illinois, at sundry points. On the Baltimore and Susquehanna Rrailroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contocook river at Hancock, N. H. Across the Connecticut river at Haverbill, N. H. Across the Contoocook river, at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Kennebec river, at Waterville, in the state of Maine.—Across the Genesse river, at Mount Morris, New-York, and several other bridges are now in progress.

The undersigned is about to fix his residence in Rochester, Monroe country, New-York, where he will promptly attend to orders in this line of business to any practicable extent in the United States, Maryland excepted. MOSES LONG.

General Agent of Col. S. H. Long.

Rochester, May 22d, 1836. 19y-tf.

PATENT RAILROAD, SHIP AND BOAT-SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes.

1J23am H. BURDEN.

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)

NEW-YORK, February 12th, 1836.

☞ THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

4—ytf H. R. DUNHAM & CO.

CHICAGO LOTS.

NOTICE is hereby given, that on the 20th day of June next, at the Town of Chicago, in the State of Illinois, the following described Property will be sold at Public Auction, to wit:

All the unsold Town Lots in the original Town of Chicago; and also the Town Lots on fractional Section No. Fifteen, in the Township No. Thirty-nine, North of Range Fourteen, East of the Third principal Meridian adjoining the said Town of Chicago. The sale will commence on the said 20th day of June, and will be continued from day to day, until all the Property has been offered for sale or disposed of. This property is held by the State of Illinois for canal purposes, and is offered for sale in conformity to the provision of a Statute Law of the said State, authorizing such a sale. The terms of sale are one-fourth of the purchase money to be paid in advance at the time of sale, and the residue in three annual instalments, bearing an interest of six per centum per annum, payable annually in advance.

Those who are unacquainted with the situation of the above mentioned Property, are informed that those Lots which are described as belonging to the original Town of Chicago, are situated in the best built and business part of the Town. Section Fifteen is a dry ridge, commencing near the harbor, and extending south, one mile, along the shore of Lake Michigan.

By order of the Board of Commissioners of the Illinois and Michigan Canal.

Attest, JOEL MANNING,
Treasurer to said Board.

Chicago, March 17th, 1836. 13—8t

PROSPECTUS

OF VOLUME II. OF THE

CHICAGO AMERICAN,

TO BE PUBLISHED SEMI-WEEKLY.

In proposing to establish a SEMI-WEEKLY paper under the old title, but with extended dimensions, the subscriber acknowledges the favors of the past, and solicits the continued patronage of a liberal public.—The reasons that induced him about a year since to establish his weekly paper, operates with renewed and increasing force in favor of his present design.—He shall endeavor, as it was originally intended, to make his paper American in all things; and by identifying itself with the interests and circumstances of Chicago—which from a recent wilderness has advanced to a population of thirty-five hundred—and of the rich, extensive, and rapidly developing country of which it is the emporium, he hopes it may "grow with their growth, and strengthen with their strength."

As a record of passing events, current literature, of the march of agriculture, commerce and manufactures, and especially of the progress of internal improvements, of which this State, by her recent passage of the act for the construction of the "Illinois and Michigan Canal," has commenced her great and auspicious system, it will aim, as ever, to be accurately and early informed, and thus endeavor to consult alike the tastes and wants of the community with which it is identified. With party, as generally understood, it will have as little to do as possible. Its politics will be the Constitution—its party, the Country.

With this brief explanation of its future course, and his thanks for the more than expected encouragement he has already received, the subscriber again ventures to solicit the continued patronage and extended support of all who may feel an interest in the principles here set forth.

It will be enlarged and otherwise greatly improved, and printed on superior paper, and forwarded to distant subscribers by the earliest mails, enveloped in a strong wrapper.

TERMS.—The AMERICAN will be published SEMI-WEEKLY, at $4 per annum, if paid at the time of subscribing; $5 if paid at the expiration of six months, or $6 if payment is delayed to the end of the year.

*** Any person procuring five subscribers and remitting the pay in advance, will be entitled to a sixth copy gratis, or a deduction of TEN PER CENT.

Persons at a distance remitting a $5 bill will receive the paper fifteen months.

*** All sums to the amount of $10 and upwards may be sent through the Post Office, at my expense.

THOS. O. DAVIS.

Chicago, March 25, 1836.

*** Subscriptions and Advertisements for the CHICAGO AMERICAN will be received at the Office of the Railroad Journal, 132 Nassau street, by

D. K. MINOR.

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation. J25tf

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens	Ames' superior back-strap	Shovels
150 do	do do plain	do
150 do	do do cast steel	Shovels & Spades
150 do	do Gold-mining	Shovels
100 do	do plated	Spades
50 do	do socket	Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
No. 8 State street, Albany.

N. B.—Also furnished to order, Shapes of every description, made from Salisbury refined Iron. 4—ytf

☞ THE NEWCASTLE MANUFACTURING COMPANY, incorporated by the State of Delaware, with a capital of 200,000 dollars, are prepared to execute in the first style and on liberal terms, at their extensive Finishing Shops and Foundries for Brass and Iron, situated in the town of Newcastle, Delaware, all orders for LOCOMOTIVE and other Steam Engines, and for CASTINGS of every description in Brass or Iron. RAILROAD WORK of all kinds finished in the best manner, and at the shortest notice.

Orders to be addressed to
MR. EDWARD A. G. YOUNG,
Superintendent, Newcastle, Delaware.

feb 20—ytf

RAILROAD CAR WHEELS AND BOXES, AND OTHER RAILROAD CASTINGS.

Also, AXLES furnished and fitted to wheels complete at the Jefferson Cotton and Wool Machine Factory and Foundry, Paterson, N. J. All orders addressed to the subscribers at Paterson, or 60 Wall street, New-York, will be promptly attended to.

Also, CAR SPRINGS.

Also, Flange Tires, turned complete.

J8 ROGERS, KETCHUM & GROSVENOR.

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

RAILWAY IRON.

95 tons of	1	inch by	½	inch.	
200 do	1¼	do	½	do	
40 do	1¼	do	⅝	do	
800 do	2	do	½	do	
800 do	2½	do	⅝	do	

soon expected.

FLAT BARS in lengths of 14 to 15 feet, counter sunk holes, ends cut at an angle of 45 degrees, with splicing plates and nails to suit.

250 do. of Edge Rails of 36 lbs. per yard, with the requisite chairs, keys, and pins.

Wrought Iron Rims of 30, 33, and 36 inches diameter for Wheels of Railway Cars, and of 60 inches diameter for Locomotive Wheels.

Axles of 2¼, 2¾, 2⅞, 3, 3¼, 3½, and 3¾ inches in diameter, for Railway Cars and Locomotives, of patent iron.

The above will be sold free of duty, to State Governments and Incorporated Governments, and the drawback taken in part payment.

A. & G. RALSTON,
9 South Front street, Philadelphia.

Models and samples of all the different kinds o Rails, Chairs, Pins, Wedges, Spikes, and Splicing Plates, in use both in this country and Great Britain, will be exhibited to those disposed to examine them.

4—d7 1meowr

NEW-YORK AND ERIE RAILROAD.

TO CONTRACTORS.—Proposals will be received at the Engineer's Office of the New-York and Erie Railroad Company, in the village of Binghampton, on and until the 30th day of June next, for grading 69 miles of the Railroad, from the village of Owego, in Tioga County, to the village of Deposit in Delaware County.

Proposals will also be received at the Engineer's Office, in Monticello, on and until the 11th day of July next, for grading 48 miles of the Railroad through the county of Sullivan, extending from the Delaware and Hudson Canal up the valley of the Neversink, and thence to the mouth of the Callikoon Creek, on the Delaware River.

Plans and profiles of the line above mentioned, staked out in convenient sections, with printed forms of the contracts, will be ready for exhibition at the said offices twenty days before the days of letting above specified.

The Company reserve the privilege of accepting only such proposals as they may deem for their advantage. JAMES G. KING, President.

New-York, 26th April, 1836. 15—tf